Telephony

◆

September 19, 1936

Telephone Progress Shown at Harvard Tercentenary

DR. F. B. JEWETT, of Bell Telephone Laboratories, Inc., tells of improved control of transmission quality and demonstrates by means of long distance calls the improvements made. New speech-reproducing equipment, developed for research purposes, which takes voice apart and puts it together in many different combinations, creates much wonder

SAVANTS from many countries, engineers, scientists and interested representatives of the general public, gathered at Sanders Theater, Cambridge, Mass., on September 11 to hear President Frank B. Jewett of the Bell Telephone Laboratories, Inc., New York, speak upon "The Social Implications of Scientific Research in Electrical Communication," as a part of the tercentenary exercises of Harvard University.

Dr. Jewett's address was accompanied by many striking demonstrations of methods of controlling telephone transmission quality, through a hook-up between Cambridge, the Bell Laboratories in New York, and widely-separated points in the United States including Los Angeles, San Francisco, St. Louis, Chicago, and Atlanta. Electrical phenomena occurring on the toll lines were amplified at Cambridge for loudspeaker distribution at the University, and for nearly two hours the audience was held spellbound with interest by Dr. Jewett and his associates.

Dr. Jewett pointed out that no modern industry more completely exemplifies than telephony the present and prospective economic and social values of applied science. So far as he is aware, no other industry so well illustrates the extension of the fundamental principles of the scientific method to control accurately, and continuously the operation of a vast human and material mechanism.

DR. F. B. JEWETT, of New York City, President of Bell Telephone Laboratories, Inc., Taking Part in Tercentenary Exercises of Harvard University, Demonstrated by Means of Long Distance Calls the Improvements Made in Telephone Transmission. He Also Told of Progress in Developing New Speech-Reproducing Equipment.

This control is imperative if the service is to have that degree of reliability demanded by the requirements of a social and business society organized to a large extent on the assumption that satisfactory telephone service is always instantly available.

Among the principal factors of this achievement have been a fortunate development of fundamental science itself in regions applicable to electrical communication, an early appreciation of the power for advancement inherent in the slow but certain results of rigorously-controlled experimentation; and in the almost equally early realization that in any community or region telephony must be a single service, but one in which the physical means and human methods of operation are so chosen as to act harmoniously with the means and methods employed everywhere else.

Added to these and furnishing a rigid yardstick by which every new proposal must be measured is the fact that time is an all-important factor. On its purely physical side, two-way telephony to be of value must involve essentially instantaneous transmission of intelligence between terminals; otherwise normal conversation would be impossible. Nothing which introduces substantial deviation from this requirement is admissible, no matter how attractive it may be otherwise.

Further, every telephone circuit, whether it be between terminals in adjacent rooms or between those separated by half or more of the circumference of the earth, must be a cleared channel established on demand with a minimum of delay in order that the correspondents be brought immediately vis-a-vis. On

the operational side, therefore, time is an essential factor. While it is inherently impossible to establish instantly any connection that may be asked for, everything that is reasonably possible is demanded, to the end that every calling subscriber is served immediately on request.

"In no other social service with which I am familiar," said Dr. Jewett, "does the element of time play such an imperious controlling part."

Telephone Service Approaches Universality

"While there are vast areas both in the science and operation regions," the speaker declared, "where we know that great progress is still possible, we have already gone sufficiently far in our development of the art to have telephone service begin to take on the form of complete universality.

"With it have come great changes in our methods of social and business intercourse, in our economic and political machinery and in the problems presented to our courts for adjudication. All of these things and their corresponding elements have their roots in science and, whether we are conscious of it or not, it is the possibilities and limitations of this science root structure which will in the end largely determine the resulting form of our society. . . .

So far have we gone already in perfecting the adaptation of science to the art of telephony that most of us when we use the telephone are not even cognizant, except vaguely, perhaps, of the fact that our ability to talk freely wherever and whenever we wish is the result of an infinite amount of work by the men in the laboratory. We are not conscious of the fact that these men have been and are being confronted daily with myriads of problems—all obstacles of one sort or another.

Some they conquer and eliminate, some they learn to control and utilize. In the end they have produced a gossamer web of filaments which, in spite of being beset with a multitude of enemies, they have succeeded in protecting and making available for its one and only function—that of enabling us to convey intelligent speech sounds to distant places. So effectively has this work been done that in many instances the men and women who install and operate the telephone plant are themselves unaware of the things to make it smoothly operative."

This "taking-for-granted" attitude on the part of many is common in every technical application of science to our daily usage. From it and from its corollary—action of a social, political or economic character with little or no understanding of the underlying and controlling forces—comes most of our problems of proper social control of these new things.

"One of the biggest, if not the biggest, educational problem ahead of us is that of teaching a vast population, which is becoming more and more dependent on the things of applied science, enough of their inherent possibilities and limitations so that they can operate the social controls without danger of wrecking the machinery."

If We Had No Telephones

Dr. Jewett then asked his audience to consider some of the implications of a United States without telephone service. "Imagine," said he, "direct railroad tracks from every city, village and hamlet to every other city, village and hamlet.

"Imagine a train on every track, steam up, ready to start at a moment's notice to any destination. Imagine the track facilities so ample that, no matter how numerous the trains, there are no delays either in going or returning. Imagine, further, that the trains move with incredible speed which in many cases is virtually that of light.

Here we have in substance the achievement of modern telephony when we realize that the cargo on the train is human thought as conveyed by the spoken word, recalling the words which Emerson wrote years ago at the completion of the first Atlantic cable:

> The lightning has run masterless too long;
> He must teach school and learn his verb and noun
> And teach his nimbleness to earn his wage,
> Spelling with guided tongue man's messages.

How uncommonly prophetic these have proved! How well the lightning has learned his lesson!"

Without the telephone, modern tall buildings and the correlated extreme density of population in many of our urban developments would be either impossible or more encumbrances than aids to life's business. To carry by messenger the communications that enter and leave a tall office building by telephone during rush hours would block corridors and elevators and produce unprecedented traffic jams in the streets outside.

For every person who walks along a busy city street, the telephone enables a much larger number to project their thoughts and personalities along the circuits below the street. Usually the telephone delivers a message and brings an answer in less than the time it would take to transcribe it for a messenger.

"Merely to mention the number of calls completed each year over our American telephone system takes us at once into astronomical magnitudes. For the past year, the number was 25 billion. While the major portion of these were local calls, a vast number were long-distance. With the added facilities and the prospect that through further research costs can be lowered, there is every reason to believe that the time is not far distant when the number will be increased many-fold."

Invisible Paths of Speech

Dr. Jewett then described the complex structure of a modern long telephone line, which neither the speaker nor anyone in his audience has ever seen in its entirety, stressing its elaborateness and fragility and the surprising electrical stability and immunity to meterological and man-made disturbances with which such a line is endowed. Open-wire construction is now rather in the minority even for long-distance service.

The speaker touched upon the value of cable construction, including the use of nitrogen gas under pressure in the interior of the impervious sheath. He described the function of loading coils and stated that these are connected at regular intervals varying from about 5/8ths of a mile to 1⅛ miles, according to circuit characteristics, in order to overcome the attenuating effect of the electrostatic capacity of the tightly packed wires.

These coils, of which there may be as many as two or three thousand called into play in the handling of a single message, must be identical to a degree characteristic of the watchmaker's precision. So close is the balance, electrostatic and electromagnetic, resulting from the repeated and uniform twisting of each pair of wires at its own particular pitch, that not over one-millionth of the power of a telephone circuit will pass over inductively to any neighboring circuit.

At intervals of 10 to 50 miles, according to the type of cable, thermionic amplifiers restore the message energy after the attenuation by resistance and other forms of dissipation. Closely associated with these are the regulators which automatically counteract the effect of

changes in conductor resistance due to changes in temperature. These regulators must allow the total amplification of a long circuit to increase between winter and summer by as much as the factor 10^{20}!

Then there are the smaller diurnal variations which it is even more important to compensate for because they are naturally of a very irregular pattern. The emergence of the sun from behind the clouds or an icy blast along one section of a toll cable is registered almost immediately by a large alteration in the attenuation of the circuits within it. In an underground cable the temperature changes are, of course, smaller in amplitude and of longer period; but for them, too, it has been found best to compensate on the automatic pilot wire basis.

So stable in operation is the telephone plant of today that in spite of the apparently fragile nature of its long lines, which in turn depend upon the uninterrupted functioning of many thousands of delicate electronic devices, it is available every hour of the day, day in and day out.

Along with growth in reliability, despite an ever-increasing dependence on delicate structures, has come a marked increase in the amount and scope of facilities as a result of the continually decreasing cost of circuits brought about by research. This combination of enhanced reliability, at cost sufficiently low to permit circuits to be provided in profusion, has made it possible to reach a distant party without leaving the telephone, and has made operating delays a rarity rather than a commonplace.

Dr. Jewett then called Dr. R. A. Millikan, noted physicist, at Pasadena, Calif., on a toll line from the stage via the regular exchanges. The Los Angeles operator replied in about 35 seconds, and Dr. Millikan answered in 1 minute and 4 seconds from the time Dr. Jewett lifted the handset in Cambridge. This conversation was amplified in the hall, and was succeeded by a conference call including the cities just named, during which convenience and accuracy of word interchange between a group of persons thousands of miles apart were illustrated, the results being as effective as though all were in a single room without seeing one another's faces.

Electrical characteristics of a circuit 1,700 miles long (round trip) between Cambridge and Charlotte, N. C., were then amplified, with corrective measures to improve transmission. These corrective facilities

Fortieth Annual Convention

Of The

United States Independent Telephone Association

Stevens Hotel—Chicago
October 13th, 14th, 15th, and 16th Inclusive

What This Means To You!!

These are important dates for you to set aside.

No matter how small your company is, you should plan to attend and benefit from the knowledge and experience of others.

On these days Independent telephone men, from every State, gather to talk over 1936 problems and to study the probable and possible problems of 1937 that they must meet and understand.

It is a meeting of the minds of the Independent telephone industry.

The best informed men in the country will address you, and answer your questions.

You rub elbows with men operating companies the same size as yours, and find that their problems are similar to your problems.

The Program!!

The program will cover all the important national telephone problems that are confronting the operating companies.

Division Conferences will be held for executives, traffic managers and chief operators, plant superintendents and engineers, and accountants where everyone interested in his particular subject can learn new things.

State Association executives will meet, study their problems, and plan cooperation.

No active, wide-awake telephone man can afford to miss these sessions.

The Independent Pioneers!!

The Independent Pioneers will hold their Annual Meeting and on the night of the Fifteenth will present their Annual Banquet and Entertainment.

Some very unusual pleasures are in store.

The Manufacturers and Supplymen!!

You will find the largest group of firms exhibiting at this Convention that we have ever had. This is a chance for you to look things over, make your plans to remodel or rebuild or extend your property, and place your orders for future delivery on all supplies.

Only once each year you have this opportunity to meet all manufacturers and go over your problems with them. Do not miss this chance of meeting your friends.

All Telephone Men Are Invited

were then removed to show the impairment of service with an uncompensated circuit. The circuit contained 40 amplifiers, each supplying an average gain rather greater than ten-fold.

Since the speech current passes through each amplifier successively, it receives this ten-fold boost at each, so that after having passed the second amplifier the total gain is 10 x 10; at the third it is 10 x 10 x 10, and the total amplification from end to end of the circuit is 10^{40}. Here we are dealing with astronomical magnitudes.

Dr. Jewett said that in terms of a more familiar physical quantity, this is multiplication about equivalent to taking a single atom of, say, silver, and magnifying its mass equal to the mass of the sun. Surprising as it is that such amplifications are attainable, it is even more unexpected to find them produced as an everyday affair with so little distortion that the final product at the receiving end is essentially indistinguishable from the original, and so perfectly under control that the over-all variation in magnitude is negligible.

Such speech transmission represents the present culmination of a prolonged study of circuit characteristics and countless laboratory investigations to discover the best instrumentalities. "We are dealing here with the same perfect balancing of processes that the living body displays and that nature has attained after speculative ages of evolution," said Dr. Jewett.

The demonstration included distortion from overloading an amplifier, and the masking of message currents by under-amplification and consequent dominance of stray currents. Commenting, Dr. Jewett said that while it would be theoretically possible to maintain perfect electrical and magnetic balance with respect to all neighboring circuits (communication and power), such balance is uneconomic in the present state of the art. The engineer is concerned with that degree of perfection which it is economical to attain and maintain.

There are certain types of telephone circuits (such as the new coaxial being installed between New York and Philadelphia) quite different from those otherwise used, not yet in commercial operation but whose development is well advanced, which do not permit either of perfect electric balancing or of shielding against outside disturbances.

Even in these circuits the noise factor still sets limits of attenuation and amplification. In this case it is not the noise of induction but the noise of the random motion of the conduction electrons in the wires themselves with which the telephone engineer has to deal. It is as though one could hear the molecules of air in a room bumping against one another. Demonstrations of so-called "electron surf" followed this statement.

Dr. Jewett then discussed the reflection problem, pointing out that in the 1,700-mile circuit to Charlotte and return the electric waves take a noticeable though very short time for transmission, and create an echo effect. In the circuit demonstrated, 0.13 second was required for the echo to be received at Cambridge. The use of echo suppressors was then illustrated with the amplified system supplying the loudspeakers.

The speaker stated that the phenomenon of reflection, aside from being troublesome when it produces an echo, also places a stability limit upon repeaters. In a long circuit, were even one or two repeaters sufficiently unstable as to increase their gain materially, the reflected currents would be large enough to cause a sustained oscillation or singing of the circuit as a whole. In a circuit with many repeaters, the telephone engineer must make certain that spontaneous fluctuations in gain are reduced to a negligible percentage.

A demonstration of the inverter privacy system of "scrambling" speech then followed, through the utilization of equipment normally employed in transatlantic telephony. The alternative "band-splitting" system was also briefly referred to, with its provision for changing the combination of the bands several times a minute by synchronous switching equipment at both ends.

It was pointed out that the Bell engineers have found it impossible to work out any satisfactory cryptic equivalent of the mutilated speech sounds which the band-splitting system produces, due to the fact that the pattern of the mutilation is constantly changing. This means that putting into any receiving device the unintelligible sounds which may be picked up will not necessarily result in intelligible sounds as it does in the case of the inverter system.

Speech Fundamentals Analyzed

Dr. Jewett then outlined recent research bearing upon the analysis of speech and touched upon the development of "synthesizer" equipment in the Bell Laboratories for the study of fundamentals. He stated that the research men had found that intelligible speech is produced by relatively few controlling factors of the speech mechanism.

By analyzing speech instantaneously to obtain quantitatively the values of these controlling factors, surprisingly accurate reproduction of the original speech can be produced by applying currents representing these factors to a proper electrical synthesizer which reproduces speech in its original form.

With the equipment in New York, a demonstration was given at Cambridge under direction of H. W. Dudley of the Bell Laboratories, showing that two noises when properly modulated and mixed, combine in perfectly acceptable speech. Each of the two noises of which speech is inherently composed has a pitch characteristic, and each has a loudness characteristic. These are analyzed in the apparatus and applied to the synthesizer.

Many curious effects can be obtained by this equipment. In the Cambridge demonstration a voice at New York spoke into a microphone which was connected with an analyzer, which in turn was connected with the synthesizer. The output of the synthesizer was transmitted to Cambridge and amplified for loudspeaker output.

By adjusting the apparatus at New York, widely varying effects resulted from the same input into the microphone. Remarkable modifications in tonal quality were obtained, and a field for research indicated in the possible combination of sounds, study of the voice and many instrumental tones. The apparatus enables

COMING CONVENTIONS

The Telephone Association of Maine, Poland Springs, September 23; Belfast, September 24; Lakewood, September 25.

Telephone and Telegraph Section, Association of American Railroads, Mayflower Hotel, Washington, D. C., October 6, 7 and 8.

United States Independent Telephone Association, Hotel Stevens, Chicago, October 13, 14, 15 and 16.

Independent Pioneer Telephone Association of the United States, Hotel Stevens, Chicago, October 15.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 11 and 12, 1937.

the experimenter to take sounds apart, as it were, and to reproduce them in a variety of air waves.

At the moment, it was said after the meeting, the commercial applications of the equipment are not being emphasized, if such exist; but a new tool of research has come to the front in the field of acoustics. It is expected that details will be published later by the Bell organization.

Co-operative Research Necessary

In conclusion, Dr. Jewett pointed out that most of the results apparent in telephone development, or which are envisaged for the future, could not have been obtained except through rigorous application of the facts and methods of science in a broad attack such as organized co-operative effort alone can make.

"It is not too much," said he, "to expect that a continuation of the method will ultimately result in the substantial destruction of the barrier to conversation, wherever and whenever desired, which distance has imposed in the past.

"Since there is even now no physical obstacle of distance, this is simply another way of saying that a continuation of organized research gives promise of providing speech channels so numerous and relatively so cheap that the economic barriers to full usage will be obliterated. When this time comes, society for the first time in its long evolutionary history will through the varied forms of communication have a complete nervous system. . . . It will make possible a type of political state which could not develop without it."

The Operators' Corner

By MRS. MAYME WORKMAN

Traffic Supervisor, The Illinois Telephone Association, Springfield, Ill.

THE CUSTOMER is not charged for a call when service is unsatisfactory because he placed call incorrectly. Series 258

QUESTION No. 2 in this week's group is one which comes up frequently, particularly in the small exchange. On a station-to-station call—and a call for the "operator" at a distant office is classed as such—conversation is considered started at the first word spoken by the called station, if the calling party is holding the line; and the call is considered complete if the correct number or address name is reached.

If the calling party is not holding the line, conversation is considered started as soon as there is an exchange of words between the calling and the called station. The call is also considered completed if the correct number or address name is reached. Therefore, the call in question would be considered completed if the calling party reached and talked to the operator at the distant office.

In some cases a customer may place a call for the operator at the distant office, with the idea that she will be able to reach the party he desires with greater facility; or, as in the question asked, he may be under the impression that, if he reaches the operator at the distant office, she will be able to locate the desired party.

When the operator at the distant office, after accepting a call of this nature, finds that the calling party desires to reach some one else and requests her to ring another number or to try to locate a party at one or more stations, she should advise him that it will be necessary to place a call for this party with his operator and suggest that he signal her for this purpose.

In a case of this kind, if the calling party makes the necessary explanation to his operator and she refers the call to her supervisor, the latter—if in her judgment the customer placed the call in good faith, with no intention of taking advantage of the telephone company—will cancel the charge on the call for the "operator" because the calling party did not receive any satisfaction on it.

If, however, it is clearly evident that the calling party deliberately called the operator at the distant point for the purpose of reaching the desired party without paying the person-to-person rate, the supervisor may make a charge for the call to the "operator," since the call is considered completed when he has reached her, and will advise him that if he wishes to place a call for the called party there will be a charge on the first call as well as on the second call.

It is not the intent of the telephone company to charge a customer for service which is not satisfactory, even though the unsatisfactory service was received through his error; for example, by placing a call incorrectly or by calling a wrong number. However, the telephone company must protect itself from fraud and must take the action necessary to discourage those who have such intention or desire.

Questions from Illinois Operators

1. Why is there a chargeable report on a collect station-to-station call when the charges are not accepted?
2. On a long distance call, when the calling party asks to talk to the "operator" at a distant point, can she ring a number or is the call considered completed after talking to the operator?
3. When a call has been placed person-to-person, party called is not in and the call is canceled, is that ticket to be found later if the call is again placed?
4. When we have peg count, should we peg the number as we answer the call or wait until the subscriber has given the number?
5. In case of an emergency, which should be taken care of first—calls concerning emergency or local calls?

The answers to these traffic questions will be found on page 18.

▼ ▼

It Is All in the Day's Work

By GLADYS CASNER

Today a very amusing incident occurred in our office. One of those particularly exasperating happenings that will pop up in any day's work, and I let out a very involuntary—well, there is no use in telling all my secrets—what do you say in a case like this? My fellow operator, who is a devout church worker, looked at me very accusingly and asked: "Do you belong to *our* church?"

Thirty minutes later, this same fellow worker and I were forced to work next to a girl (I whisper it to you) who is quite frankly an obnoxious sort of person. My fellow operator whispered to me: "I don't know whether I'll ever live over this. She looks just like an old witch, doesn't she?" I smiled at her quite blankly and asked: "Do you belong to *our* church?"

TODAY'S OBSERVATION OF AN OPERATOR: "The sweetest words of tongue or pen" —you've guessed it—is 'wt am.'

FCC Orders Probe of Bell Interstate Rates

REDUCTIONS IN Bell long distance rates declared insufficient and FCC, on its own motion, initiates rate investigation to proceed at once. Carl I. Wheat, as special counsel, is in full charge of the rate proceeding

DECLARING that the recent reductions by the A. T. & T. Co. in long distance telephone rates are insufficient to satisfy complaints that the rates are unreasonable, the Telephone Division of the Federal Communications Commission on its own motion on September 9 ordered an immediate investigation of the Bell long distance interstate rates.

This move launches the rate investigation which has been awaited since the inception of the general Bell investigation and which has been touched upon only sketchily in the inquiry so far. In charge of the rate investigation will be Carl I. Wheat, California utility rate expert, recently employed by the commission for this specific purpose at a salary of $9,000 a year.

In its resolution ordering the investigation of the Bell System's long distance rates, the commission said testimony received in the special investigation of the Bell as directed by Congress in 1935, "indicates a record of profits over a long series of years which warrants a thorough investigation."

"The matter of reasonable toll rates is of such vital importance to the public that the commission should proceed at once with an investigation of such rates," the order continued.

Commission's Reasons for Ordering Investigation

Pointing out that, by the Communications Act of 1934 it is charged with the duty of regulating the rates, charges, classifications, services and practices relating to interstate services of common carrier communication companies, and that by joint resolution of Congress approved March 15, 1935, it is authorized and directed to investigate and report on the American Telephone & Telegraph Co., the commission's order said:

"It further appearing that complaints have been made from time to time to the Federal Communications Commission concerning the rates, charges, classifications, services and practices of the American Telephone & Telegraph Co., with respect to the rendition of long distance communication services in interstate commerce; and that testimony introduced at hearings before this commission indicates a record of profits over a long series of years which warrants a thorough investigation;

"And that such rate reductions and adjustments as have been voluntarily made by the American Telephone & Telegraph Co., are insufficient to satisfy the complaints made to this commission that rates and charges are unreasonable; and,

"That it is essential that the telephone investigation now being conducted under special investigation docket No. 1 proceed as expeditiously as possible, without the usual controversial issues of a rate proceeding; and that the matter of reasonable toll rates is of such vital importance to the public that the commission should proceed at once with an investigation of such rates.

"Good cause therefore appearing, it is hereby ordered that an investigation upon this commission's own motion be and the same is hereby instituted into the rates, charges, classifications, services and practices, and each of the same, of American Telephone & Telegraph Co., a New York corporation, in the rendition of interstate utility services.

"It is further ordered that American Telephone & Telegraph Co., rendering nationwide service, be made respondent to this proceeding and served with a copy of this order."

It is further ordered that the proceeding be assigned for hearing at such times and places as the commission may hereafter direct.

Commissioner Brown Initiates Action

The Telephone Division on September 9 approved and ratified the following motion of Commissioner Brown, presented August 14:

"I move that the commission, under the authority of section 205 (a) of the Communications Act of 1934 and of Public Resolution No. 8, Senate Joint Resolution No. 46, immediately initiate a rate investigation into the charges, classification, regulation and practice of the American Telephone & Telegraph Co. in interstate commerce.

"I further move that the chairman of the Telephone Division of the Federal Communications Commission be directed and instructed to immediately contact Carl I. Wheat of Los Angeles, Calif., regarding his availability as special counsel to have full charge of such investigation and that the chairman report back the results of such negotiations at the earliest possible date."

The Telephone Division, also on September 9, noted the following action taken by its members on August 31:

"Carl I. Wheat, of Los Angeles, Calif., is hereby appointed associate counsel, telephone investigation, especially in charge of long lines toll rates and other rate matters incident or relating thereto, at a salary of $9,000 per annum, effective September 15, 1936, under the provisions of Public Resolution No. 8 of the 74th Congress and the Communications Act of 1934, and subject to the provisions of the laws, resolutions, or acts of Congress, and the Federal Communications Commission."

Chairman Walker's Comment On Bell Reductions

Chairman Paul A. Walker of the Telephone Division of the FCC, in charge of the special Bell investigation asserted that the toll rate cuts put into effect by the A. T. & T. and associated Bell companies on September 1 were only "a drop in the bucket."

The rate inquiry just ordered will be conducted as a parallel to the general investigation now in progress, Mr. Walker said, although public hearings on rate matters will not be held until most of the incidental matters have been taken up. No date has been set either for an answer by the telephone company or for the beginning of public hearings, but Mr. Walker expected that hearings would be held sometime during the fall.

Much preparatory work must be

done by Mr. Wheat, he explained, and the groundwork laid for the conduct of public hearings.

Chairman Walker said that the company would have all the opportunity desired to present its side of the case. The hearings, he stated, will not be of an "ex parte" nature.

The rate investigation, Mr. Walker said, does not necessarily mean a valuation study will be undertaken, although he admitted that valuation probably would figure in the matter.

While asserting that recent rate cuts of A. T. & T. were of no material consequence, Mr. Walker said the commission had received numerous complaints about high rates. He mentioned in particular the charges for person-to-person calls in contrast to rates for station-to-station calls for the same distances.

Complaining parties, he said, have asked why, after they have paid extraordinarily high rates for person-to-person calls for three minutes' duration, they had to continue to pay the high rate after the three minutes' time was up. Such complainants, Commissioner Walker said, inquired if the extra charge for the three minutes did not sufficiently compensate the company for the added trouble.

In explaining why he thought the recent rate cuts were not "a drop in the bucket," Commissioner Walker cited the fact that they apply only on calls for distances over 234 miles. The reductions, then, he declared, do not apply to the great bulk of intrastate calls which make up a great part of the long distance business.

While the rate probe will be under the immediate direction of Mr. Wheat, Samuel Becker, assistant special counsel, will continue the general phases of the investigation, Commissioner Walker said.

WPA Gives Township A Competing Telephone System

GOVERNMENT PROVIDES money, labor and materials for construction of telephone line in territory already being furnished adequate service by Bear River Valley Rural Telephone Co., Bear River, Minn. Financial ruin faces the latter company which has been in existence for 20 years, according to company officials, as approximately 75 per cent of its total revenues will be cut off due to the "free" service afforded by the new line made possible by the WPA

FROM MINNESOTA comes a story of the Federal government providing money to build a competing telephone line that, according to officials of the telephone company which has provided service in that territory for 20 years, will mean the financial ruin of the latter company. The WPA not only furnished money for the competing line, which is now practically ready for operating, but also provided the labor and materials for its construction, so that it will cost the users nothing and intercommunity service will be free of charge.

The Bear River Valley Rural Telephone Co., Bear River, Minn., was organized by business men of the Iron Range and farmers of the Bear River Valley community back in 1916—about 20 years ago—for the purpose of erecting and maintaining a telephone line from Hibbing to Bear River. Some $6,000 were spent to establish the company and since then about $1,000 annually have been spent for operation and maintenance.

The company has been in operation all these years, furnishing satisfactory telephone service to all the residents along its line, a distance of approximately 30 to 35 miles. The line has served the Brown community, the townships of French, Bearville, Morcom and Carpenter, and an unorganized township in St. Louis county known as Township 63-20.

French Township is located about midway on the Bear River line and has had an average of 8 to 12 telephones on its own township telephone system constructed in 1922 or 1923 under the statutes of the state of Minnesota granting townships the power to erect and maintain township fire telephone lines. The other townships likewise have township telephone systems which had connections with one another and with Hibbing through the Bear River company's exchange at Bear River for outside telephone communication.

It appears that the townships ran behind in their payments for telephone service and for several years the Bear River company was given township warrants which were not negotiable or cashable. In 1933 the Bear River company demanded that the townships pay cash for their telephone service. This action is upheld by an opinion of the attorney general's office to the effect that the telephone company had the right to demand cash in payment for its service. Cash not being forthcoming, the company, in the spring of 1933, refused further service to the township systems.

The French Township system was later connected to the Bear River line by means of a jack knife switch which was maintained at French Township. This provided adequate facilities and outside communication for that particular township. Morcom Township, on April 1, 1936, again contracted for service with the Bear River company and obtained connection to Hibbing over the Bear River company's line.

Carpenter Township, in 1935, applied for a WPA loan to construct a toll line from Nashwauk to Carpenter Township, a distance of approximately 35 miles. Application was made to the Minnesota Railroad & Warehouse Commission by the township. The erection of the line was opposed by the Bear River company, unless the Carpenter township would purchase its facilities which were used for Carpenter Township service. The commission refused permisson to the township for the erection of the line on the ground that the township could not prove that it was financially able to build and maintain the line.

In the spring of 1936, or the fall of 1935, French Township applied for a WPA loan to build a line from French Township to the village of Hibbing, a distance of approximately 16 miles. The

WPA, under project No. 2275, appropriated $5,700 to build approximately 20 miles of line with five copper circuits, to which would be connected every telephone in French Township to the village of Hibbing. The line would be maintained by French Township without any toll charge to any person in the township for a call to the village of Hibbing.

The line was to be built without any cost to the residents or the users in French Township, as the government was to pay for all the labor and all the costs for the poles, wire, crossarms, and other material used in the construction of the line. In other words, WPA project No. 2275 provides for a government subsidized telephone line competing directly with the previously-established telephone system.

Since 1933, French Township has increased in population, due to additional summer residents establishing homes around Sturgeon Lake Chain in French Township. A number of CCC camps were located in French Township along in 1932 and many improvements have been made in the territory since, thus attracting the new summer residents.

For the past four or five years the Bear River company states that it has received approximately 75 per cent of its income from French Township—from six pay stations, which it has maintained in the township, in addition to the 8 or 12 telephones connected to the French Township system.

Thus, it is seen that with the completion of WPA project No. 2275, about 75 per cent of the income of the Bear River company will be lost, for none of the residents in French Township will pay a toll charge to Hibbing for a call over the line of the Bear River company when calls may be made free to Hibbing over the line built by the WPA for French Township. The Bear River line, as junk, would probably bring approximately $200, according to company officials, and that means the loss to the investors in the company of practically all of their investment.

French Township, on June 30, was given an opinion by Assistant Attorney General David Erickson that the township would not have to obtain an order from the Minnesota commission for the completion of the system. This was based upon a letter from Attorney Strizich, of French Township, that the township line would not compete with any other system.

The Minnesota commission, being unaware of the opinion of Mr. Erickson, which was apparently issued directly to the WPA office without copies being sent elsewhere, demanded of the Attorney General's office an opinion based upon a statement of facts prepared and presented by its telephone division. About August 6, Assistant Attorney General Pike rendered an opinion that the township of French would have to obtain an order from the Minnesota commission before its line could be erected. This opinion of Mr. Pike, however, was recalled when it was found that it conflicted with the previous opinion of Mr. Erickson.

Meanwhile, the line is under construction and work was expected to be completed by the middle of this month.

The attorneys for the Bear River Valley company state that none of these townships has sufficient financial resources to even start proper maintenance of its own telephone system. The completion of the WPA project means that the government will put the Bear River company out of existence, it is stated. They point out that within 10 years the lines erected by WPA will be so rundown that they will be almost useless, none of the townships having sufficient money to properly maintain or keep them in repair. In other words, it is predicted, in 10 years the townships to the north of Bear River will have no telephone communication whatsoever.

The Bear River Valley Rural Telephone Co., although a member of the Minnesota Telephone Association since last fall, did not notify the association of its troubles until early June—after the WPA loan was made and work started. Had the matter been taken up with the state association and the United States Independent Telephone Association at the time the application for the WPA loan was made, the facts in the case could have been presented to the authorities in Washington, D. C., by the national association and the interests of the Bear River company protected.

The experience of this small company shows the importance of telephone companies notifying their state organization promptly of any difficulties which arise in which the state or federal government is involved. Prompt action can then be taken by state and national telephone associations to protect the interests of the telephone company. In this case at Bear River, Minn., the associations were not notified or brought into the case until after "the horse was stolen."

Answers to Traffic Questions on Page 15

1. For the effort made to complete the call involving the use of toll circuits and operator's time.
2. Please refer to preface of the question on page 15.
3. No special effort should be made to compare tickets or to search for a ticket where the call has been previously placed. It is contemplated that when a customer cancels a call, the operator will at that time volunteer any information necessary to let the customer know that further efforts may be made to complete the call at a later time.
4. A call should be pegged as soon as you hear the customer's voice. If the call is pegged as you answer the call, it may result in an incorrect peg count record, due to the signal being a false signal with no one on the line.
5. Emergency calls take precedence over all other classes of calls.

▼ ▼

Plans for "Independent Telephone Week"

With "Independent Telephone Week" a little more than three weeks distant, arrangements for the 40th annual convention of the United States Independent Telephone Association are rapidly nearing completion. The convention will be held at Hotel Stevens, Chicago, commencing on Tuesday, October 13 and closing on Friday, October 16.

Already exhibit rooms on the 25th floor of the hotel—where the association's headquarters and registration desks also will be located—have been assigned to 47 firms interested in supplying equipment, apparatus materials, supplies or services to the operating companies. This is the greatest number of exhibitors listed for a national convention and undoubtedly it will be considerably increased by the time the meeting opens on October 13.

With such a large number of exhibitors, convention visitors will have an exceptional opportunity to bring up to date their information concerning developments in plant and exchange equipment, supplies and materials. The exhibits decidedly should be well worth spending considerable time with.

The convention this year will witness the resumption of the division conferences which were dropped from the program several years ago. There will be conference sessions of the association's accounting, commercial, plant and traffic divisions.

At the general sessions the program will provide discussions of national economics and regulatory problems.

The plans for the convention, as de-

(*Please turn to page 33*)

DEVELOP THIS *New* MARKET FOR PRIVATE EXCHANGE SERVICE

with these small unattended P-A-B-X units

The new Automatic Electric P-A-B-X units, created to serve a small number of telephones on an unattended basis, open up an extensive new market for this type of service. Small businesses, professional offices, the larger residences — formerly composed a class of user for whom ordinary P.B.X. service was unsuited due to its necessity for constant attendance.

With these self-contained, self-operating P-A-B-X's, full automatic interior service with trunk connections to the public exchange, can be offered to the smallest user on a basis he can afford, as no attendant is required. Interior service is instant, accurate and always available, a definite improvement over any other type. Trunk calls can be placed or "picked up" from any station.

Telephone men—there is a vast potential market for this new service. Telephone companies will find it highly profitable to cultivate this field.

Automatic Electric P-A-B-X units are compactly contained in neat, dust-proof, all-metal cabinets. They are easily installed, fully accessible and require only small space.

AUTOMATIC ELECTRIC

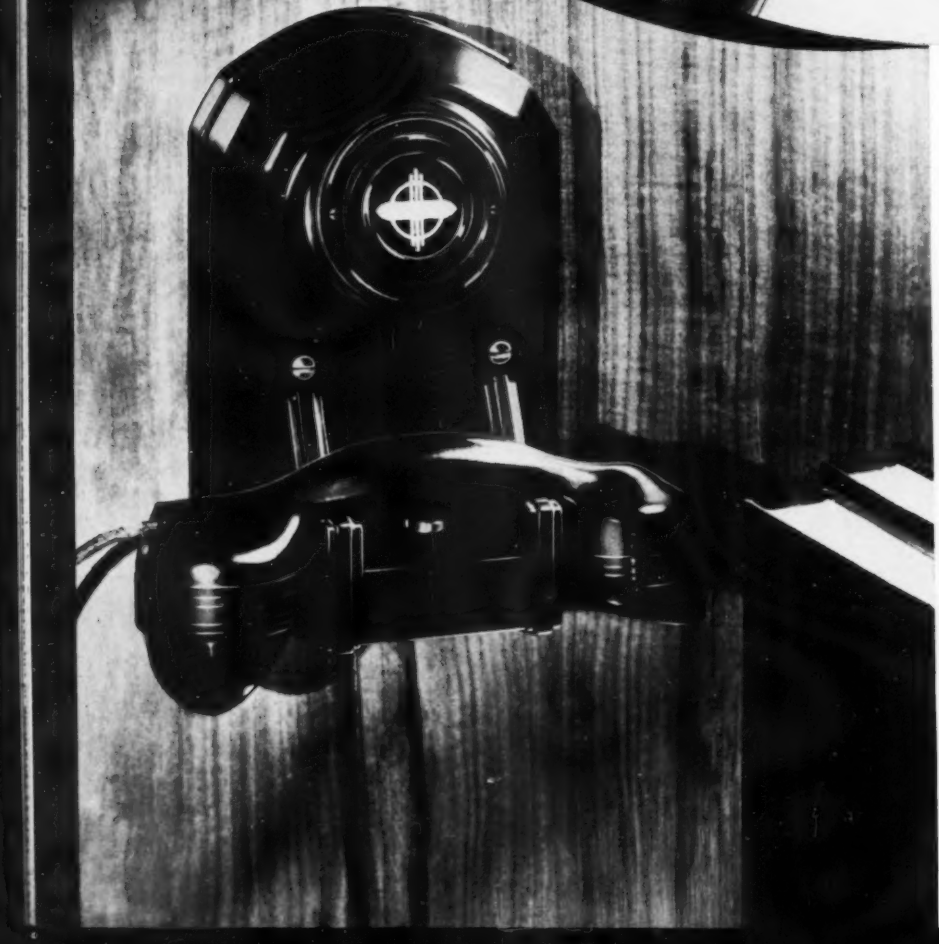
TELEPHONE, COMMUNICATION AND SIGNALING PRODUCTS

Distributed by:

AMERICAN AUTOMATIC ELECTRIC SALES COMPANY, 1033 W. Van Buren St., Chicago
Export Distributors: AUTOMATIC ELECTRIC SALES COMPANY, LTD., Chicago

★

Above: The Type 34A3 self-contained desk Monophone. No bell box is required for this model, since all parts are contained within the compact, molded base.



At Left: The Type 35A5 wall-mounting Monophone for manual service. This, as well as other Monophone models, can be furnished for either manual or automatic operation, and also in a variety of art shades with chromium or gold-plated trim. Send for descriptive color circular.

★

★

AUTOMATIC ELECTRIC

Monophones

HAVE ESTABLISHED MODERN TREND IN COMPACT, SELF-CONTAINED DESIGN

These two Monophones have established themselves as the style leaders in present-day telephone design. They have achieved a new compactness, a new gracefulness of line in complete sympathy with modern artistic trends, yet in no sense displeasingly radical.

No wonder subscribers say they enjoy using these instruments, so well does the handset "fit" the hand, so perfect is its balance, so clear and natural the transmission. Telephone managers are finding that the introduction of these Monophones creates an intense interest and desire in the minds of the public, which can be advantageously utilized to sign up new contracts and renew old ones.

Automatic Electric Monophones have given new life to the telephone business since these new models were presented to the trade. Evidently telephone companies are finding them excellent both as a sound investment in modern plant equipment and as an active stimulant to increased income. Why not try them in your territory?

AUTOMATIC ELECTRIC

TELEPHONE, COMMUNICATION AND SIGNALING PRODUCTS

Distributed by:

AMERICAN AUTOMATIC ELECTRIC SALES COMPANY, 1033 W. Van Buren Street - - Chicago
Export Distributors: AUTOMATIC ELECTRIC SALES COMPANY, LTD., - - - - - - - Chicago

IN THE NATION'S CAPITAL

By FRANCIS X. WELCH,
Special Washington Correspondent for TELEPHONY

NOW THAT the FCC has officially embarked on its long-awaited rate case against the American Telephone & Telegraph Co., it may be of some value, in the interest of better understanding of the entire situation, to analyze the procedural steps under way.

First of all, it should be understood that the commission order launching the probe is not a "show cause" order. There seems to be some misunderstanding about that. For example, The Wall Street Journal, always alert and usually accurate, seems to have slipped on this point. In its issue of September 8, it commented at length on the strategy of a "show cause" order whereby the FCC could shift the burden of proof to the A. T. & T. and predicted that the commission would take such a course. In its issue of September 11, it stated that the commission had taken such a course.

Such was not a fact, however, because the commission order of September 9 was, instead of a "show cause" order, an order for an investigation on the commission's own motion. Here is the text of the pertinent paragraph of the commission's order:

"Good cause therefore appearing, it is hereby ordered that an investigation upon this commission's own motion be and the same is hereby instituted into the rates, charges, classifications, services and practices, and each of the same, of American Telephone & Telegraph Co., a New York corporation, in the rendition of interstate utility services."

TO THE NON-LEGAL reader the difference between a "show cause" order and an investigation on the commission's own motion may seem something like the distinction between Tweedledum and Tweedledee, but there is in effect a very essential difference.

The "show cause" order, as the Wall Street Journal correctly observed, has the effect of shifting the burden of proof. Instead of the commission proving that Bell toll rates are too high, the company is required to prove that they are not too high or, in other words, "show cause" why rates should not be reduced.

There is an important legal limitation, however, on the use of the "show cause" order, even where a commission is authorized by statute to adopt such procedure. It is that there must be some at least tentative finding by the regulatory body, based on some *prima facie* evidence that rates are too high. Merely calling them too high won't do; that would probably be held by the courts to be an arbitrary and capricious act.

The courts do not insist that a commission base a "show cause" order on a complete valuation or make elaborate findings, but they probably would require that the commission at least look over the various cost factors that underlie a utility's rate structure and try to make reasonably intelligent and superficially plausible findings as to the condition of such factors before issuing an order directing a utility to show cause why its rates should not be reduced.

IT IS PROBABLY for this reason that the FCC did not attempt the "show cause" procedure in opening its A. T. & T. rate case. It does not mean, however, that the FCC may not adopt it at a later date when the rate case record is complete enough to warrant it. It is clear that the record so far made in the general Bell investigation falls far short of supporting any findings at all as to the reasonableness of interstate toll rates.

Do not misunderstand. These rates may ultimately be shown to be unreasonably high or otherwise, but the commission has not developed sufficient evidence to show even a *prima facie* case, for the simple reason that the inquiry has not even touched all of the phases that would have to be considered. It is quite likely, therefore, that when the investigation on the commission's own motion (which is the procedure used to develop evidence of this character) opens up under the direction of Special Counsel Carl I. Wheat, an effort will be made to round out the evidence so as to provide a basis for a "show cause" order at a later date.

Whether the commission will do this or conduct the entire rate case along the more conventional investigatory lines is yet to be decided. FCC Telephone Division Chairman Paul A. Walker gave a clew, however, when he stated in a recent private interview that if some valuation of Bell toll properties were found to be necessary, a spot check valuation would perhaps suffice.

Mr. Walker gave the impression that in any event the commission has no intention of embarking on a long or elaborate rate valuation of Bell toll properties. If the experience of the Interstate Commerce Commission in the analogous work of valuing railroad properties is any guide, such a valuation would take years—many years, perhaps.

Obviously the FCC does not intend to wait years before issuing its toll rate order, and so it seems not unlikely that it will take a short cut by building up a skeleton case on a paper record and issuing a "show cause" order on the base of it.

THERE is another way in which the commission could issue a toll rate order without going through the tedious process of formal valuation—that would be by basing its order on discrimination rather than unreasonableness of the Bell toll structure. The Interstate Commerce Commission has done this occasionally with sectional railroad tariffs. Whether the Bell's toll rate structure is in such a condition that an issue of discrimination could be supported is not known. Here, again, at least *prima facie* evidence would have to be developed.

That the FCC would embark on a rate case as the outcome of its special Bell investigation has been suggested a number of times in this department. Indeed it required no great prophet to foresee this development. Mr. Walker was frank enough to say so before the House appropriations subcommittee last spring.

It is not so obvious, however, just how Mr. Walker ever expects to justify his recent alleged statement to the effect that recent voluntary Bell toll rate reductions were "entirely inadequate" and a "drop in the bucket." Of course, the FCC telephone division expects to reduce Bell toll rates more than the Bell has reduced them itself, but Mr. Walker is putting himself pretty far out on the limb with this "drop-in-the-bucket" line of conversation.

Talking quite bluntly, the situation as a practical matter shapes up something like this: The FCC is in hot

water, especially the Telephone Division. It must do something to save its face. It must produce results before next February 1 when its special investigation money will be about gone. Hence the rate case. That is perfectly understandable.

The Bell, on the other hand, is probably willing to make concessions —even sacrifices—to settle the investigation. The FCC knows this perfectly well and, of course, the Bell knows it. Both sides have something to trade and the public stands to benefit thereby if the slice is reasonable.

Draw your own conclusions. If the cut is reasonable, the Bell will probably accept; the FCC's face will be saved, but Chairman Walker with his "bucket" will be left high and dry. On the other hand, if the FCC finally orders any such reductions as the "drop-in-the-bucket" statement would infer, the Bell will probably be forced to go to court and the FCC would stand a grand chance of taking a licking.

It is a puzzling situation. Maybe when the time comes for handing down a rate-cut order, both sides will politely forget about the "drop in the bucket" and the FCC will take what it thinks it has a fair chance of getting.

WITH THE toll rate case starting up, the special telephone investigation under Special Counsel Samuel Becker seems likely to wind up as a side-show. The commission made it perfectly plain in its order that the balance of the special investigation is to be conducted separately and "as expeditiously as possible without the usual controversial issues of a rate proceeding."

This probably means that Mr. Becker will be given orders to get busy and wind up his part of the case pronto. The commission probably hopes in this way to put an end to all the bricks being thrown in its direction of late for the way the special investigation has been conducted so far.

As for Chief Accountant John H. Bickley, the other stormy petrel of the special investigation, the latest rumor has it that he might not be adverse to taking a nice job somewhere else in the Federal service. If the election fates are kind to the New Deal, such a spot may be found for him; otherwise, Mr. Bickley may soon tire of official Washington and its tribulations, and seek new worlds to conquer.

Please understand that this information is not intended as "propaganda." It is obtained, as the security statements used to say in the old days, "from sources believed to be authentic, but is not guaranteed."

GOING FROM the special investigation to the routine telephone work of the commission itself, some important scraps are, as the newspaper headline writers would say, "looming." Of principal interest to Independent telephone companies is the series of cases involving attempts of the commission to extend its jurisdiction over companies claiming to be Independent.

Some comment was recently made in this department about the Rochester (N. Y.) Telephone Corp. case concerning which Chief Examiner Arnold has already reported to the effect that the Bell exercises enough "control" to warrant FCC jurisdiction.

More recently the case of the Champaign Telephone Co. of Urbana, Ohio, was argued before the telephone division. From the remarks of the commissioners it seems likely that the commission will uphold Mr. Arnold's report.

It is interesting to note that in response to the telephone company's plea that dual Federal and state jurisdiction would be burdensome to a relatively small company, Division Chairman Walker said "the commission has no desire to be unduly burdensome with any regulation." He pointed out that a small company can send necessary reports to the FCC by mail and could, for the most part, file with the FCC copies of reports already prepared for the state commissions.

On the whole, it seems that the FCC is reconsidering its previous attitude of grasping jurisdiction over all companies possible. The Rochester case is, of course, a debatable case. The Urbana case is clearly a very close case, since a single share seems to be the only difference between 50 per cent Bell ownership. Obviously, the commission is justified in looking into such a case very closely for evidence of actual Bell control.

In less debatable cases, however, the FCC has lately given the benefit of the doubt to the Independents as witnessed by its adoption of chief examiner reports classifying as "connecting carriers" the DeKalb-Ogle Telephone Co. of Sycamore, Ill., the Citizens Independent Co. of Clay County, Brazil, Ind., and the two Ohio companies at Mansfield and Chillicothe. Also, as a result of its recent decision on broadcasting wire service, jurisdiction was waived over the various Independents previously unclassified.

One interesting development in this respect, however, was the exceptions filed by the Wisconsin Public Service Commission to the chief examiner's report asserting FCC jurisdiction over the North-West Telephone Co. of Tomah, Wis., on grounds of Bell control.

It will be recalled that the "control" in this case resulted from the fact that the president of the company had pledged a certain amount of North-West shares with the Wisconsin Bell as collateral for a certain loan. Although the loan has since become in default, the Wisconsin commission asserted that the Wisconsin Bell company would not be in control of the North-West company until it took steps to acquire and actually did acquire the pledged securities.

This may seem like a technicality, but when it is recalled that only the holder of stocks on the books of the corporation can vote them (except in the case of an authorized proxy) it will be seen that there is a good deal to be said for the Wisconsin commission's position.

In any event, it indicates that some of the state commissions, at least, are not going to lie down and let the FCC invade their intrastate jurisdiction without an argument.

▼ ▼

Bell System to Retain Its Pension Plan

The American Telephone & Telegraph Co. and associated Bell companies according to press dispatches from New York City, dated September 4, are not contemplating at the moment any change in the present benefit and pension plan. The new Federal social security act and its effect when it becomes operative, have been carefully studied by A. T. & T. executives.

In 1913, the Bell System put into effect a benefit and pension plan whereby pensions were granted to every employe upon automatic compulsory retirement at 65 years. The plan provides 1 per cent a year based on the last or highest salary over a ten-year period.

The plan is set up on an actuarial basis with the company contributing 0.3 per cent of operating revenues. This fund each year amounts to about 3 per cent of the annual pay roll.

It is estimated that the government plan will be more expensive than the company's own plan. The principal gain to the public and to the company, in its own plan, is the definite and orderly plan for retiring superannuated employes.

"Through Service We Grow"

By L. M. HAYES

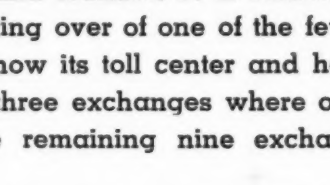
INSPIRING STORY of the organization and development of the Lee Telephone Co., of Martinsville, Va., a story of the personal achievements of its president and founder, B. L. Fisher. Climax of its accomplishments was the taking over of one of the few remaining municipal plants in the country, now its toll center and headquarters' exchange. Toll calls dialed from three exchanges where operators are located to any subscriber of the remaining nine exchanges of the company

TELEPHONE SERVICE has taken on a new and fuller meaning in the territory bounded on the north by Roanoke, Va., on the south by Winston-Salem, N. C., on the east by Danville, Va., and on the west by the famous Blue Ridge Mountains of Virginia, since the organization of the Lee Telephone Co. by B. L. Fisher, now of Martinsville, Va.

Starting out, in 1903, with one small exchange—Rocky Mount, serving 40 subscribers—the Lee Telephone Co. (successor to the Franklin County Telephone Co.) has expanded until it now operates ten exchanges in four counties of Virginia (Franklin, Patrick, Henry and Pittsylvania) and three counties of North Carolina (Rockingham, Forsyth and Stokes) with a total of more than 2,000 subscribers and 45 employes, and owns and operates all of the toll lines in its territory.

Mr. Fisher is justifiably proud of the high character of service afforded by its all-copper toll circuits as well as the high standard of local service in the various communities served by its exchanges. "Through Service We Grow" is the watchword which Mr. Fisher and his associates have constantly kept before themselves. And by pursuing this goal as a standard of achievement in the various exchanges which, from time to time, have been taken over, the company has won the confidence of the public in the territory in which it operates.

The story of the Lee Telephone Co. is practically the personal biography of its president and founder, B. L. Fisher, whose interest in telephony dates back to the time when he took his own telephone apart to find out "what made it talk." In order to satisfy his interest in things electrical, he subscribed for and read practically all of the telephone and



B. L. FISHER, Founder and Operator of the Lee Telephone Co., Martinsville, Va., and Its Predecessors, Commenced as a Troubleman on a Rural Line Some 35 Years Ago.

electrical journals available in the early days. He also took a course in telephone engineering from the International Correspondence Schools, finishing a three-year course in six months' time, with grades of 100 per cent on most of his examinations.

Born and raised on a farm near Bonbrook, Franklin county, Va. (one of the seven counties in which the company now operates), Mr. Fisher attended country school five months out of the year and spent the rest of the time performing various duties on his father's farm. He later became a school teacher and taught in the country schools for four years at a salary of $22.50 a month.

When he became 21 years of age, his father made him a gift of a horse and saddle and urged him to get out to seek his fortune. Continuing his teaching, the young man did some trapping during his spare time and sold $50 worth of fur. At the end of the school year, with a capital of $172, he set out upon the venture of matrimony. His father-in-law made him and his bride a present of a small house and four acres of land.

Mr. Fisher set to work to erect a small store building and invested his capital in a miscellaneous stock for a general store which his wife conducted while he was busy teaching school.

Soon thereafter a telephone company was organized in the town of Rocky Mount, 12 miles distant; and when lines were extended to the surrounding countryside, Mr. Fisher put in his application for service. When the lineman and his assistant came to install the telephone, Mr. Fisher asked them what made the telephone talk. They could not tell him, so—after they had left—he proceeded to find out for himself by taking his telephone apart. Later, upon seeing a book entitled "A B C of Telephony" advertised in the AMERICAN TELEPHONE JOURNAL, some 35 years ago, he purchased a copy and practically learned its contents by heart.

One of the directors of the company furnishing him with telephone service learned in some way of Mr. Fisher's interest in the operation of the telephone and asked him to keep in repair a few instruments in his end of the county. To this he readily agreed, supplementing the transmitter, receiver and induction coil furnished him by the director with a pair of pliers and a screw driver which he purchased himself. The compensation agreed upon for his services was 15 cents an hour, including the use of his horse and buggy for transportation.

Soon a case of trouble, four miles from the store, was reported to Mr. Fisher. The newly-recruited telephone repairman set out with his horse and buggy and his repair kit. After looking the telephone over, he had a hunch that the trouble was in the induction coil. Further inspec-

tion proved his hunch was right.

After some additional experience in clearing trouble, he was called upon by the company to string wire. At first he used a ladder but soon he became adept in using climbers to ascend telephone poles. At this time the company had only two rural lines. They had been strung as two-wire metallic lines but were later separated into four grounded lines. Whoever made the separation had failed to ground the wires at the switchboard. As a result the four lines rang together as one line.

The lines were gone over, from time to time, in an effort to locate the trouble. Mr. Fisher was then asked to see if he could clear the trouble. After much testing and deliberation and some correspondence with manufacturers of telephone equipment, the young lineman put ground wires on the switchboard. To his great joy and satisfaction, the trouble was cleared.

Immediately after this experience the company invited Mr. Fisher to take charge of the Rocky Mount plant, which then had about 35 telephones. This he consented to do. Under the arrangement agreed upon, he was to receive as compensation one-half of the gross receipts (the rates were $1 and $1.50 a month), out of which he was to pay the operator's salary. Service was rendered from 6 a. m. to 10 p. m. week days, there being no Sunday service.

View of Rocky Mount Exchange and Office Building, of Brick, Steel and Concrete Construction.

Mr. Fisher set to work in earnest to learn all he could about the telephone business. He read and re-read every telephone publication he could find. Finally, someone suggested to him that he take a course by mail from the International Correspondence Schools. This he did and, as mentioned previously, he completed a three-year course in telephone engineering in the short period of six months.

His interests in electricity were not confined to the telephone, however. He learned a great deal about electricity as applied to power. He gave the town of Rocky Mount its first electric light plant, installing it without assistance—even to the wiring of the switchboards and generators.

Mr. Fisher organized the local hydroelectric power company, making the complete installation—including a concrete dam and power plant. Then he organized and trained the local fire company, of which he was chief until he moved his residence to Martinsville several years ago. With a population of about 1,200 Rocky Mount has a two-story brick engine house and up-to-date fire-fighting equipment. In addition to the many activities already outlined, Mr. Fisher was for years the only electrical contractor in his town.

Selling his power plant and his electrical wiring business in 1925, he purchased all of the stock in the local telephone company — the Franklin County Telephone Co., as it was then known. He was retained, however, by the Appalachian Electric Power Co., which purchased his hydroelectric power plant, to look after the company's business in Rocky Mount.

During the last several years prior to the time of selling to the Appalachian Electric Power Co., Mr. Fisher had organized the Stuart Telephone Co., a new corporation. This corporation built the town of Stuart, Va., giving it a new cable plant and common battery telephone service. He had also organized in North Carolina the Fisher Telephone Co., another corporation which had built the towns of Stoneville, Mayodan, Madison, Walnut Cove and Walkertown.

A magneto switchboard was first installed at Stoneville, but this was soon replaced with an unattended dial plant. Madison and Mayodan are located only two miles apart and have grown until now they are almost as one town. As these two towns grew a complete cable system was installed in Madison and extended into Mayodan, the switchboard being at Madison. Common battery service was given.

Walnut Cove was given a good cable plant and magneto service. Walkertown was fitted up with the second unattended dial exchange.

At this time Mr. Fisher was operating his exchanges under three incorporated companies: Franklin County Telephone Co., which owned Rocky Mount, Bassett and Fieldale; the Stuart Telephone Co., which owned the exchange at Stuart; and the Fisher Telephone Co., which owned Stoneville, Madison, Walnut Cove and Walkertown. Soon after selling his power interests to the Appalachian Electric Power Co., Mr. Fisher merged his three interests into what is now known as the Lee Telephone Co. This name was selected, first, because it was short and easy to write, and second, because it

was the middle name of both Mr. and Mrs. Fisher.

By this time the Lee Telephone Co. was serving all of the towns on the highway between Roanoke and Winston-Salem, except Martinsville, and all of the plants had been rebuilt or new plants installed. Bassett, Va., which is not on the highway, had been taken over, the plant rebuilt and the company's third unattended dial exchange installed. As soon as the new plant was completed, the number of subscribers jumped from 80 to 135.

Early in 1930, shortly after the rebuilding of the Bassett exchange, negotiations were again entered into for the purchase of the Martinsville municipal telephone plant, serving a city of 7,700 people. By September 1 the deal was consummated, the purchase price being $100,000.

This marked a milestone in the history of the Lee Telephone Co. Its exchanges almost completely surrounded the county-seat town of Martinsville and for years had been connected to it by means of its own high-grade copper toll circuits. The Lee company also had afforded the municipal plant toll connection by way of Winston-Salem, to the territory of the Southern Bell Telephone & Telegraph Co. and by way of Roanoke into the territory of the Chesapeake & Potomac Telephone Co. Of the 12 toll lines entering the Martinsville exchange, 10 were owned by the Lee Telephone Co. and the remaining two by the Bell company.

The Martinsville plant was originally built in 1900 by some 35 of its citizens much on the basis of a farmers' mutual. D. L. Bowles, a jeweler, was the only man who knew enough about the telephone to make repairs when needed. One by one the telephone subscribers turned their interest in the plant over to him in exchange for service on a rental basis. Soon he found himself owning the local plant.

In 1907, however, Mr. Bowles was accidentally killed and the following year his widow sold the plant to the city. It consisted of about 190 telephones of the Sumter type, connected to a Sumter magneto switchboard. Mr. Fisher had made a bid of $5,000 on the plant but the city outbid him by the amount of $1,600.

The city administration, in 1922, replaced the magneto equipment with a Kellogg feature switchboard. During the ensuing eight years Martinsville experienced a rapid growth and, at the time the municipal telephone plant was sold to the Lee Telephone Co., was a city of 8,000 people with 800 telephones.

The Lee company, upon acquiring the Martinsville plant, in 1930, found that no joints on its lines had ever been soldered. Workmen were immediately set to work to clean the wires, remake the joints and solder them. Immediate improvement in service was noted.

Intensive training was given the Martinsville operators—who had received no training for their work—by one of the best chief operators in Virginia. Questionnaires sent to subscribers, a short time after the change in ownership of the Martinsville plant, brought in replies from a large majority that service was much improved.

On December 1, 1930, Martinsville became the toll operating center of the Lee Telephone Co., and in the summer of 1931 the exchange was cut over to dial operation. The new exchange equipment, of the Strowger automatic type, was installed in a newly-erected building, especially designed for the purpose. It is two stories in height, of pressed brick and stone construction, presenting a most pleasing appearance.

Business and executive offices occupy the first floor and the switching and toll equipment the second floor of the building. Ample storage facilities are provided in the basement. A one-story extension to the main building provides garage facilities for the company's automobiles and trucks. Martinsville's new central office equipment, with toll dialing

Photograph of Employes of the Lee Telephone Co., Taken at One of Company's Annual Banquets.

TELERING

ECONOMY ◆ RELIABILITY

Order One NOW for a 30-day Free Trial

Reliable ringing service is essential in providing satisfactory telephone service.

Use TELERING and provide the MOST reliable service at the LEAST cost.

Current Consumption negligible.

Positively No Radio Interference

Directly converts Commercial Alternating Current to Telephone Ringing Current.

You can always depend upon our full co-operation and prompt service.

ONLY ONE CONTACT!

PRICE $44.00 EACH
F. O. B. Elyria

Sold by Leading Telephone Distributors

TELKOR, INC., ELYRIA, OHIO

300 Extra hours!

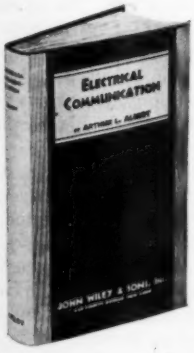
BURGESS 12F3 SWITCHBOARD BATTERY

Inland Equipment Co., Distributor, Max F. Hosea, President, Indianapolis, Ind.

Discusses the entire industry!

ELECTRICAL COMMUNICATION

By ARTHUR L. ALBERT
Associate Professor of Communication Engineering, Oregon State College



A study of the various specialized phases of electrical communication as related to the usages of modern communication systems. This book presents not only theory but a discussion of the entire industry. Although not highly mathematical, the creament is exact, up-to-date, and in accord with the highest engineering standards. The communication engineer will find this book a valuable addition to his working reference library.

448 Pages 6 by 9 $5.00

TELEPHONY PUBLISHING CORPORATION
Telephone Wabash 8604 608 S. Dearborn St., Chicago

Cable

...and 60,000 other items

WHERE dependability counts—only the highest quality electrical products will do. One such quality product is Western Electric Lead Covered Cable—a cable whose dependability is insured by the most exacting of manufacturing standards.

But that's not all. Out of its roster of 60,000 electrical items Graybar is prepared to meet *any* need of a telephone industry. And behind *every* Graybar item stands the Graybar reputation for quality that goes back 67 years.

Graybar

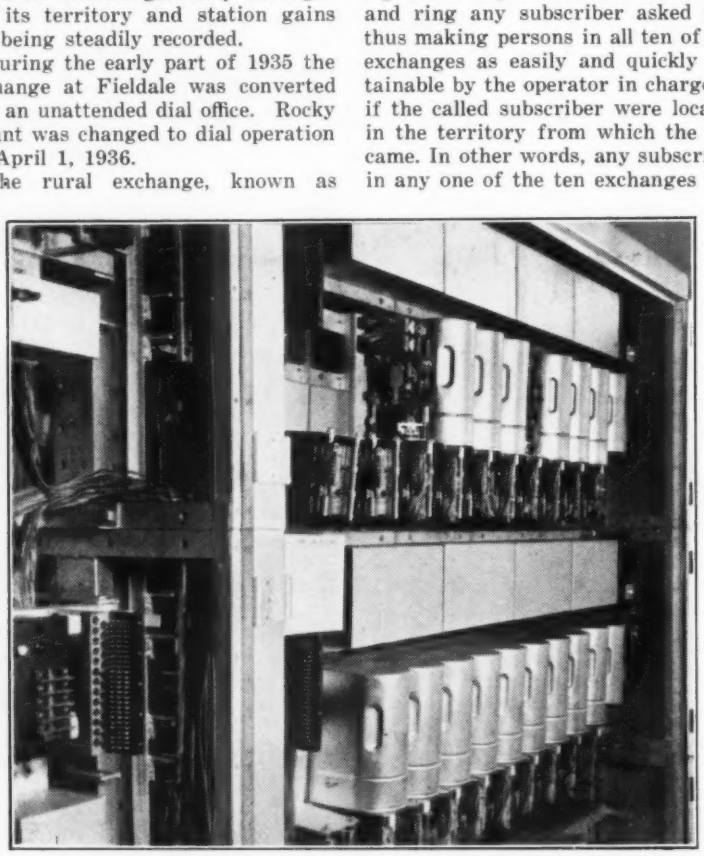
OFFICES IN 79 PRINCIPAL CITIES
EXECUTIVE OFFICES: GRAYBAR BUILDING, NEW YORK, N. Y.

throughout the company's entire system, was described in detail in TELEPHONY of July 30, 1932.

Since the acquisition of the Martinsville municipal plant, the Lee Telephone Co. has continued to improve its service generally throughout its territory and station gains are being steadily recorded.

During the early part of 1935 the exchange at Fieldale was converted into an unattended dial office. Rocky Mount was changed to dial operation on April 1, 1936.

The rural exchange, known as Bachelors Hall and located between Martinsville and Danville, was purchased early in 1935. This was an old magneto exchange with lines so rusty that a splice could not be made in most of the wire then in service.



Dial Equipment in the Rocky Mount Exchange.

This exchange territory has been rebuilt completely. New creosoted poles and copper wire were used and the fifth unattended dial exchange installed. This was cut into service July 1, 1936. Mr. Fisher says that although there undoubtedly are rural exchanges with copper wire and dial telephones, the one he has finished at Bachelors Hall is the only one of this kind that he knows about. It's useless to say that the service is fine.

A new toll line between Martinsville and Danville was built in 1935.

All of Mr. Fisher's exchanges are now dial except Stuart, Va., and Madison and Walnut Cove, N. C. Mr. Fisher now has plans for making all the exchanges dial. When this program is completed there will be operators only in the exchanges at Rocky Mount and Martinsville, Va., and Madison, N. C.

An operator in any one of these three exchanges will be able to dial right into any one of the other nine and ring any subscriber asked for, thus making persons in all ten of the exchanges as easily and quickly obtainable by the operator in charge as if the called subscriber were located in the territory from which the call came. In other words, any subscriber in any one of the ten exchanges will be reached as easily as if subscribers were all in one exchange.

This, of course, requires toll dialing. Mr. Fisher says that it works perfectly, and that he will be glad to demonstrate to telephone men visiting his territory how successfully he is using toll dialing and making money by being able to give rapid service between exchanges.

Not only does the New York-Atlanta highway run through the heart of the territory served by this progressive company, the Norfolk & Western Railroad runs right by all of its central offices. In addition to the excellent transportation facilities, all of the towns and cities served by the Lee company have unlimited power for industrial expansion.

Mr. Fisher has not confined his attention to the activities of his own company. He was active in the organization of the Virginia Independent Telephone Association and has served as director and president since its formation in the fall of 1934. He is also a director of the United States Independent Telephone Association, president of the Martinsville Kiwanis Club and takes an active interest in all community welfare activities.

The progress and development of the Lee Telephone Co., under the able direction of Mr. Fisher, have furnished material and inspiration for feature stories in TELEPHONY (December 20, 1930, January 17, 1931, and July 30, 1932), in The Transmitter, in newspapers in the communities in which the company operates and in the house organ, "Ambition," published by the International Correspondence Schools. In concluding this sketch TELEPHONY quotes several paragraphs from the article which appeared in the last-mentioned publication:

"If a man studies and acquires early in life habits of efficiency, thoroughness and attention to detail, these habits will become characteristics of his work throughout his life. This fact is clearly illustrated by the close supervision which Mr. Fisher gave to the construction of the Lee Telephone Co.'s home plant in Martinsville, a large, modern, fireproof building on the city's main business street.

Although he might have called in an experienced telephone engineer and an architect and turned the details of construction over to them, Mr. Fisher personally went over every detail of the new plant and made numerous changes and improvements, based on his long experience as a telephone worker.

In fact, Mr. Fisher has organized his plant and trained his employes so efficiently and the daily work of his business moves along so smoothly that he has time to devote to his many outside interests. He is actively interested in church affairs throughout the state. He is also an amateur photographer of note and, with his specially-equipped movie camera, he can be seen frequently pursuing his hobby at various scenic spots that have made his section of Virginia famous.

Visitors to the Lee plant are heartily welcome, and Mr. Fisher is always happy to show interested parties through the building and explain to them the latest developments in telephone engineering, for he is as proud of his company's new and modern telephone equipment as he was in years past of the old induction coil with which he solved his first telephone problem."

The New Birmingham Trunk and Toll Exchange

By J. HOLE

Siemens Brothers & Co., Ltd., Woolwich, England

FEATURES of apparatus installed in new Trunk and Toll exchange in Birmingham, England, the country's most important long distance communication center apart from London. New automatic exchange of 10,000 lines' ultimate capacity also to be installed in the new "Telephone House" for British Post Office

BIRMINGHAM is approximately the center of England, both geographically and telephonically, and apart from London it is the most important center in the country for long distance communication. It is not only connected by direct lines with other principal cities and towns, but also forms an important link in the alternative trunking routes between London and other towns in the north, such as Liverpool, Manchester, and Sheffield.

The rapid growth in Great Britain's long distance telephone traffic can be appreciated from the extensive equipment which the British Post Office has found it necessary to provide in a new "Trunk and Toll' exchange at Birmingham. The manufacture and installation of this large exchange was entrusted to Siemens Brothers & Co., Ltd., of Woolwich, England, who have also a separate contract for a new automatic exchange of 5,720 (ultimate 10,000) lines, which is being installed in the same building.

An imposing new building (Fig. 1) known as "Telephone House" has been erected to accommodate these exchanges and to provide offices for the Post Office engineering and administrative staffs. It provides accommodation as follows:

BASEMENT: Two main distributing frames, trunk test racks, power plants for telephone exchanges and repeater equipment, and a heating chamber.

GROUND FLOOR: Central automatic exchange, and engineering staff offices.

FIRST FLOOR: Repeater equipment and staff accommodation.

SECOND FLOOR: Trunk and toll apparatus room, and offices for traffic and sales staff.

Fig. 1. Telephone House, Birmingham, England, Which Accommodates the Trunk, Toll and Central Exchanges Together With the Administrative Offices of the Post Office, Etc.

Reliable

ALL METAL CABLE TERMINAL

The B27 is modern and outstanding in design, with added assurance of long "terminal life".

Made in three types for three standard cable terminal fuses. Write for further information or a sample.

•

RELIABLE
ELECTRIC COMPANY
CHICAGO

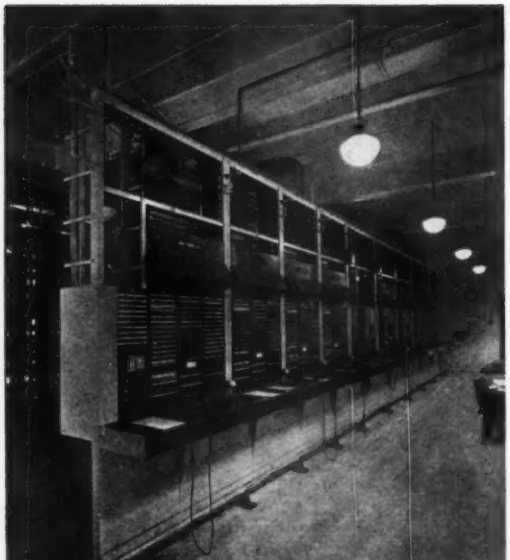


Fig. 2. General View of Test Racks.

THIRD FLOOR: Reserved for welfare accommodation with the exception of two rooms for the signaling lamp relay racks associated with the switchboard multiples.

FOURTH FLOOR: Trunk and toll switchboards with directory trunk and toll enquiry, service P. B. X. and information card positions.

The Trunk exchange is the first portion to be brought into service and will be followed shortly by the Toll exchange. This article deals with the Trunk and Toll equipment and briefly outlines features of the apparatus located on each floor.

Main Distributing Frames in "Telephone House"

Two main distributing frames, each comprising 97 verticals, are installed in the basement with their exchange sides facing each other. Frame A is equipped with the protective apparatus for nearly 6,000 lines associated with trunk and toll, and for 2,900 subscribers on Central automatic exchange. Frame B is equipped for 800 incoming junctions, 800 outgoing junctions, 700 through circuits and private wires and 2,800 Central subscribers.

At a height of 6 ft. 3 ins. from the floor a mezzanine platform is placed around each frame, with connecting bridges at the ends and in the center. The platform is suspended from overhead girders, leaving a clear space underneath except for steps from the floor to the platform. Strip lights are fixed to the underside of the platform to illuminate the lower portion of the frame.

Across the two frames and overhead is fitted a cross-connecting field to allow jumpering between the frames.

Trunk Test Racks

Trunk and toll line testing is provided for on a trunk testing rack, a practice which now supersedes the test desk on all large trunk exchanges. Break jacks and associated busying keys are provided for each line, the lines brought through the testing rack totaling 3,740.

There are four trunk testing positions, three toll testing positions, one miscellaneous position, and a megger panel at each end of the rack. The meggers are operated from the public alternating current supply via a rectifier unit to give 250 volts direct current. The arrangement is such that the operation of a switch causes a mercury contact relay to connect the supply to the rectifier. By means of a safety locking device, any operation of the megger switch or test keys is mechanically prevented, while the power supply is being used for a megger test.

The usual testing cord circuits are fitted in the keyshelf, but patching cords are located in canopies. A front view of this rack is shown in Fig. 2.

Power Plant for Exchanges

The power plant serves the whole of the telephone equipment for Trunk, Toll and Central exchanges. Two motor-generator sets are installed, and accommodation is provided for an engine-driven generator if required later. The motors are of the synchronous induction type, 50-cycle from the 400-volt, three-phase, 50-cycle public supply mains. The output from the generators on full load is 1,600 amperes at 57 volts.

There are two sets of lead-acid batteries, each having an initial and ultimate capacity of 9,900 ampere hours. They are operated on a charge-and-discharge basis, or either may be floated with one or both generators on the exchange busbars.

A C.E.M.F. battery of seven cells reduces the main battery voltage to provide for PBX power supply and is capable of carrying a current of 105 amperes continuously.

Two ringing machines are provided —one driven from the public supply, and the other from the main battery. Each has an output of four amperes and provision is made for automatic change-over from the power-driven set to the battery-driven set in the case of failure of the public supply.

Fig. 3. View of the Switchroom of the Trunk and Toll Exchange in Birmingham, England. The Number of Positions Provided Initially in This Switchroom is 367 of Which No Less Than 102 Are in One Straight Line.

The equipment for the various link circuits between the switchboard multiples, lines and calling equipment, located on the second floor, is made up as self-contained jacked-in units, designated "Relay Sets." These are mounted on channel-type shelves, each accommodating 10 relay sets, but the number of shelves on a rack varies and is dependent upon the size of the relay set, i. e., upon the amount of apparatus required for the various circuits.

Relay Set Racks

The racks are 4 ft. 6 ins. wide and 10 ft. 6 ins. high. In addition to the relay sets they carry the associated circuit fuses and "U" links for disconnecting tones, ringing, etc. No less than 79 of these racks are provided to mount the 6,333 relay sets which form the initial requirements for the Trunk and Toll exchange.

The 500/20-cycle ringing receivers are of special interest, as they represent recent development on the part of the British Post Office. The facilities afforded are: (a) Operation of the trunk-line calling signal on receipt of 500 cycles, interrupted 20 times per second; (b) transmission of 500/20-cycle signal to line; (c) immunity from false operation due to speech or interrupted signals; and (d) operation off the exchange battery.

The receiver consists essentially of a limiter-amplifier; incoming signals are stepped up by the input transformer and supplied to the grid of a valve. The output from this valve is applied to a resonant circuit via the output transformer and thence to a pentode valve. Power is then fed back to the rectified reaction circuit. The pentode valve supplies direct current pulses to the impulse relay at 20 P. P. S.

A "Ringing Unit Panel" mounting two 500/20-cycle ringers is installed conveniently near and connected to the ringing receivers.

The relay set racks are arranged in the British Post Office standard manner, i. e., apparatus side to apparatus side and wiring to wiring, and traveling ladders are fitted in the apparatus gangways.

There are two intermediate distributing frames on the second floor, one for Trunk and the other for Toll. Each has 60 verticals with 10 terminal strips per vertical. The circuits on the relay set racks are all cabled to one of these frames, which also terminates the trunk, outgoing junction, and answering multiples, from the various switchboards. Where multiples appear on more than one switchboard suite, the cables are teed at the I. D. F.

As far as possible switchboard multiples and their associated terminating equipment have been arranged on adjacent verticals on the frames to avoid long jumpers. As, however, many of the relay sets are suitable for either trunk or toll service, a flexible arrangement for connecting to either I. D. F. is obtained by the provision of 1,100 tie lines between the two frames, so eliminating cross-connecting wires between the frames. In addition, there are tie cables for 600 circuits to the Central exchange I. D. F.

Chargeable Time Indicator

The mechanism for the 18-minute chargeable time indicator equipment associated with the cord circuits is fitted on 18 racks. A uniselector type of switch and associated relays are required for each cord circuit requiring C.T.I. facility.

The uniselector is controlled by a lever key in the cord circuit with start, stop and reset positions, and provides for a maximum period of 18 minutes. The equipment for a "Time Announcing Signal" is also fitted on the C.T.I. racks. This signal consists of four tones or "pips," spaced at one-second intervals, and is generated by a valve oscillator equipment giving 900 cycles per second. By means of this signal the subscriber is warned of the approaching expiry of each three-minute period of 12 seconds beforehand.

There are four bays of special apparatus racks equipped with miscellaneous circuits not suitable for mounting as relay sets and, therefore, strip-mounted.

A fuse board, 20 feet long, serves the trunk and toll switchboards, supervisor's desks, etc.

Lamp Relay Racks on Third Floor

The outgoing junction free line signal lamps and multiple answering lamps are fed from the alternating current public supply mains, stepped down by a transformer to 13 volts. The transformers are fitted on racks, which also accommodate the associated lamp relays. Low-consumption six-volt lamps are used, and these are wired on a three wire system with the center wire earthed.

In the event of an interruption in the supply of alternating current to the answering lamps, a stand-by arrangement comes into operation immediately, and a supply is taken from a six-volt tap on the main battery; at the same time an alarm is given.

As it is essential to reduce the voltage drop to a minimum, the lamp racks are situated as near as possible to the associated switchboards, so as to avoid heavy gauge conductors.

The free line signal lamps may be switched off during the night or other slack periods by throwing a key fitted in a C.T.S. which breaks the circuit of the mercury arc relay switches. A further key similarly placed provides for

ROEBLING
electrical
Wire & Cable

Paper Insulated and Leaded Telephone Cable... 150 Pairs

Telephone Cable... Paper Insulated and Leaded.

★

Telephone Switchboard Cable ... Silk and Cotton Insulated and Leaded.

★

Twisted Pair and Parallel Telephone Wire... Rubber Insulated and Braided (bronze, copper, iron, and copper-weld).

★

Bare Copper and Bronze Wire.

★

Bare Galvanized Steel Wire.

★

Galvanized Steel Strand.

JOHN A. ROEBLING'S SONS CO.
TRENTON, N.J.
Branches in other cities

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

routine testing the automatic change-over arrangement. The contacts of these switches are placed between the power supply and the input winding of the step-down transformer.

Switchroom on Fourth Floor

All switchboard suites and desks for Trunk and Toll associated services are accommodated on this floor. The number of positions provided initially is 367.

Although all are in the one room, "Trunk" and "Toll" are actually separate exchanges and each has its own supervising staff with three supervisors' desks. The switchroom is U-shaped and a photograph cannot be obtained to indicate the whole of the suites, but Fig. 3 gives an idea of the suites along the main portion of the room. Its feature is the suite of 102 positions in one straight line.

Fig. 4. Trunk and Directory Enquiry Tables, Each Accommodating Four Operators, in the Telephone Exchange at Birmingham, England.

All switchboard sections are of the British Post Office standard type for large boards, each having seven panels for face equipment and arranged for three operators' positions. With the exception of those for the Trunk enquiry boards, all sections are 6 ft. 4¼ ins. high. The Trunk enquiry board is an island suite of 4 ft. 6 ins. height so as to afford a clear view as far as possible across the room.

The keyshelves throughout are similar in construction and dimensions, but differ in their equipment according to the class of service dealt with. The answering jacks and lamps of incoming lines are multipled on a 12-panel basis to afford access from a large number of operators and to improve the speed of answering.

Outgoing multiples are repeated every five panels and certain groups are fitted with free line lamp signals. The latter are arranged so that the first free line of a group is indicated by a lamp glowing under the associated jack. If for any reason a group of trunks cannot work on a "Demand" basis, a control key is thrown by the supervisor and a lamp preceding the group warns the operators that calls over the group will be delayed.

The Trunk exchange has three switchboard suites comprising a demand and combined demand and delay suite of 102 positions, a delay and telex suite of 33 positions and an incoming (jack-ended) trunk suite of 60 positions.

The "Demand" positions deal with outgoing traffic to distant exchanges from local subscribers over trunk lines on which there is no delay. Delay positions are similar, but their function is to complete calls over trunk lines on which delay working is in force.

Both demand and delay suites have six cord circuits per position, and each cord circuit is fitted with a chargeable time indicator equipment. The incoming trunk suite deals with the calls from other trunk exchanges. The cord circuits on these positions are not equipped with C.T.I. facilities, as the timing is controlled at the originating trunk exchange. As the operating time per call is considerably less than on demand or delayed calls, more calls can be handled by each inward operator, and 12 cord circuits are provided per position.

Cord circuits are of the sleeve control type throughout. The principle of this system lies in the simple straight-through connection from the answering to the calling plugs without transmission equipment. The direct connection is broken when the speaking key is thrown, and the cord circuit is connected through the position circuit, giving the trunk operator access to either or both parties.

The signaling equipment, proper to each type of line, incorporates the feeding bridge and is controlled over the sleeve of the plug.

The outgoing multiple comprises 720 outgoing junctions without free line signals, 660 with free line signals and 700 trunk lines. These appear on all three suites.

Pneumatic tubes are provided on trunk positions for the transit of tickets to either a distribution position (P.D.P.) or to the ticket-filing position (T.F.P.). Tickets for calls to be completed on a delay basis are sent from the demand positions to the P.D.P., from which they are sent by pressure tubes to the delay positions and completed tickets are despatched to the T.F.P.

The Toll exchange deals with the short trunk or toll connections to be set up on a no-delay basis between exchanges within the toll area centered on Birmingham. The switchboard equipment comprises a Toll "A" suite of 62 positions, a Toll "A" centralized manual board and service P.B.X. suite of 40 positions and a Toll enquiry suite of 69 positions.

The two A suites have 14 cord circuits per position with four or five of them fitted with chargeable time indicators. The Toll enquiry suite has six cord circuits per position without C.T.I. equipment.

The Toll switchboards have 340 outgoing junctions without free line signals, 1,100 outgoing junctions with F.L.S. (each being multipled every five panels), and 1,020 answering jacks and lamps multipled every 12 panels.

Information Trunk and Directory Tables

There is an information card table of 12 positions, connection with which is obtained from a jack in the toll switchboard multiple. An operator who desires information contained on the cards filed at this table, plugs into the appropriate jack and an assignor connects the head set of an idle clerk who supplies the required information.

There are six trunk and directory enquiry tables, each accommodating four operators. Each table has a cabinet on two sides, in which are fitted incoming and outgoing multiple jacks. Two positions on this suite are appropriated for fault positions. Three cord circuits per operator are provided, these being of the same type as on the switchboards.

A general view of these tables is given in Fig. 4.

▼ ▼

New York District Meeting at Newburgh

The New York State Telephone Association announces a district meeting and traffic conference for September 23. It will be held at the Washington Hotel, Newburgh. Companies in that territory are invited to have representatives present by J. G. Ihmsen, vice-president and general manager of the association.

PLANS FOR INDEPENDENT WEEK

(*Concluded from page 18*)

tails are being worked out, show that everyone connected with the industry—directors, executives, employes—will obtain much of value through attendance at this year's annual gathering of the independent telephone industry.

The Independent Pioneer Telephone Association will hold its annual meeting at the close of the general session on Thursday afternoon October 15. Later, everyone at the convention will join the Pioneers for "An Evening at a Night Club."

The terms of 11 directors expire next month. The directors, whose terms conclude with the convention, are:

Frank S. Barnes, Rock Hill, S. C.; John P. Boylan, Rochester, N. Y.; J. G. Crane, Kansas City, Mo.; P. M. Ferguson, Mankato, Minn.; W. F. Goodrich, La Crosse, Wis.; H. L. Harris Chicago, Ill.; C. L. Jones, Athens, Ohio; Frank A. Knapp, Bellevue, Ohio; J. Y. Rust, San Angelo, Texas; K. B. Schotte, Kittanning, Pa.; and A. Wardman, Whittier, Calif.

▼ ▼

Independent Pioneers' Entertainment to Be "Tops"

Members of the entertainment committee of the Independent Pioneer Telephone Association are actively working out the details for the Pioneers' "Evening at a Night Club" during "Independent Telephone Week" in Chicago next month. Reports of committee members to Chairman George W. Rodormer are showing growing enthusiasm as the working out of details progresses.

Advance information of the committee's plans indicate that the Independent Pioneers and their friends, after their "Evening at a Night Club," will find themselves difficult to be pleased with visits to other night clubs. The Pioneers' evening, it is predicted, will be "tops" in night club entertainment.

It is expected that details of table arrangements will be completed this week, so that announcement of the procedure for securing table reservation tickets can be made next week. As previously stated in TELEPHONY, tickets for the "Evening at a Night Club" with the Independent Pioneers are priced at $3 each. This pays for the dinner, floor show and dancing—an entire evening's entertainment.

The tables seat eight people each, and it is suggested that those planning to attend arrange for parties and secure reservations together. Thursday, October 15, will be "Independent Pioneer Day."

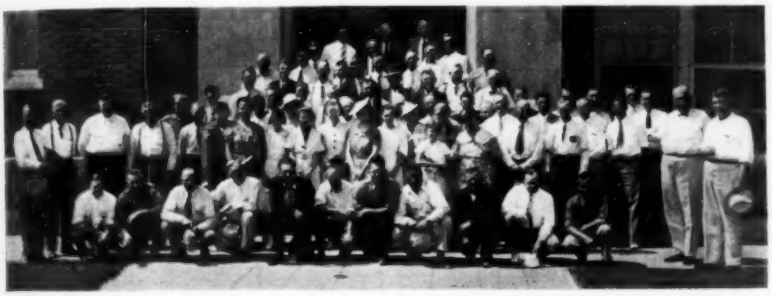
▼ ▼

Wisconsin District Meeting Acts Regarding Accounting

Round table discussions of taxation, social legislation including minimum wage laws and the unemployment insurance act, accounting methods, inductive interference, and other subjects were discussed at a two-day district meeting at Wisconsin Rapids, Wis., on August 27 and 28. The meeting was attended by members of the Wisconsin Locally Owned Telephone Group and the Wisconsin State Telephone Association.

Appointment of a committee to study proposed changes in accounting methods and submit them to the Wisconsin Public Service Commission for approval, was voted by the meeting. John A. Pratt, Madison, was named chairman of the committee, with Ben Smart, Wisconsin Rapids; Herman Hoerl, Marshfield; T. H. Sanderson, Portage; and Harry Price, Markesan, as other members.

Announcement of a school of accounting to be jointly sponsored by both of the organizations—the Wisconsin Locally Owned Telephone Group and the Wisconsin State Telephone Association—was made. It was scheduled to be held in Madison beginning September 17.



A Goodly Crowd of Telephone People Gathered at Alexandria, Minn., on August 11 to Attend the District Meeting Held by the Minnesota Telephone Association. The Alexandria Telephone Co., of Which Leland Wright is Secretary and General Manager, Was Host. Mr. Wright is a Past President of the Association and Is at Present a Director. Among Those in the Photograph May Be Seen F. C. Marvin, of Zumbrota, President of the Association (Extreme Left, Standing) and Secretary J. C. Crowley, Jr., of St. Paul (Second From Left, Top Row). The Subjects Discussed at the District Conference Included Rural Electrification, Traffic, and Standards of Maintenance and Construction.

"The Squeaky WHEEL GETS THE GREASE"

Lightning or Power Crosses Give You No Such Warning

THE SAFEWAY IS TO INSTALL OOK PROTECTION

The equipment that has proven successful, safeguarding hundreds of telephone plants and millions of cable pairs.

OOK Equipment costs no more. Insist on OOK

Protected Pole Cable Terminals
Unprotected Pole Cable Terminals
Central Office Protection
Sub-station Protectors
Lightning Arresters
Fuses

OOK ELECTRIC CO.
CHICAGO

"Telephony's" Engineering Data

By B. C. BURDEN

Index, Vacuum Tube Practice.
Sept. 19, 1936.
No. 11-A, Page 8.

Again, if sufficient gas is present in tubes operated at a fairly high plate voltage, the plate current may become excessive and damage the tube. Extensive tests on gaseous tubes have shown that in tubes operated with low grid bias, grid current may be set up which reduces the effective input resistance in the tube. This, in turn, causes a broad tuning effect (in RF stages), due to the fact that this resistance is transferred into the tuned RF circuit.

Gaseous tubes, if in the audio end of a radio set, will usually manifest themselves in poor quality, and in the radio frequency end by a broad tuning or in some cases erratic tuning.

Theory of Gas Test

One of the best tests for gas in amplifying tubes consists of measuring the plate current of a tube under the condition where the grid is biased at some normal negative potential and again under the condition where a high resistance is inserted in with the grid battery and grid as shown in Fig. 3. The theory of this test is as follows:

If gas is present in a tube there will generally be a small current flowing in the grid circuit, either in the direction of grid to filament or from filament to grid. If this current is allowed to flow through a series resistor of several hundred thousand ohms, it will set up a voltage drop across this resistor which will either add to or buck the normal grid bias voltage.

Obviously if the plate current is measured under the condition of the resistor in the circuit and then again with the

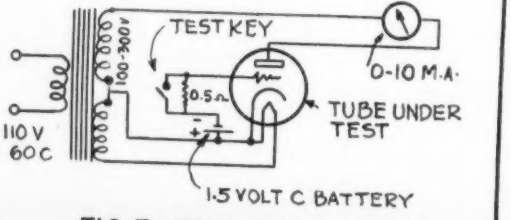


FIG. 3. GAS TEST CIRCUIT

"Telephony's" Engineering Data

By B. C. BURDEN

Index, Vacuum Tube Practice.
Sept. 19, 1936.
No. 11-A, Page 9.

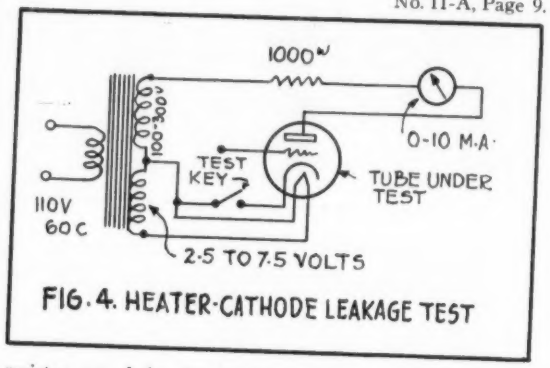


FIG. 4. HEATER-CATHODE LEAKAGE TEST

resistor out of the circuit, the presence of any grid current and its cause—gas in the tubes—are made apparent by the change in plate current due to the change in grid voltage.

Cathode Leakage Test

One other type of miscellaneous test that can be made is known as the cathode leakage test and is necessary only on tubes of the cathode heater type. The indirectly-heated cathode type consists essentially of a thin metal sleeve coated with some electron-emitting material and a heater element contained within and separate from the sleeve.

The heater is made from resistor wire and is used for the purpose of heating the sleeve. It is surrounded by a ceramic insulating material and this in turn by the metal sleeve which is coated with some electron emitting chemical. Frequently, due to impurities in the ceramic insulating material, a conducting path is established between the cathode and the heater. Where these two are at the same potential, this is of no serious consequence. However, if the cathode and heater are often maintained at a difference of potential between each other, a leakage path will cause noise in a radio set.

A simple method of testing for leakage consists in measuring the plate current under the condition when the plate battery is connected to the plate and to the filament and with the cathode open. Under this condition, if there is any current flow, there must be leakage between the filament and the cathode. This is shown in Fig. 4.

"Telephony's" Engineering Data

By B. C. BURDEN

Index, Transmission Data.
Sept. 19, 1936.
No. 16-A, Page 1.

Use of an Alternating Current Voltmeter in Reading Decibels

Any alternating current voltmeter of the voice-frequency rectifier type can be used to read the power level on a telephone line in terms of the decibel, provided the impedance of the voltmeter is at least 1,000 ohms or higher per volt. The power level decibel meter is merely an alternating current voltmeter calibrated in decibels instead of volts.

For those who have available an alternating current voltmeter of the rectifier type, a conversion chart for use in converting a voltage reading into decibels can easily be made by computing the power level in watts that would exist across a telephone line whose assumed impedance is 600 ohms, under the various voltage readings within the range of the voltmeter for which the chart is designed. This method is fully described in the following paragraphs.

Method of Computing Values for Conversion Chart

In using decibels to express power levels, we must refer the measured power level on the telephone line to the *standard power level for zero decibels.* The Bell System some time ago established a zero reference level of .006 watt as the bench mark to which power level readings would be referred.

To illustrate how voltage can be converted to decibels, let us examine the relationship between voltage, impedance, and power. If the impedance of a telephone line and the power across this impedance is known, the voltage which would exist under the power conditions can be determined by multiplying the power in watts by the impedance in ohms. This is shown in the following example:

$$E = P Z = .006 \times 600 = 1.89 \text{ volts.}$$

Thus:

$$0 \text{ db} = 1.89 \text{ volts (for 600-ohm lines).}$$

Having established the voltage for zero decibels, we can quickly determine the decibel corresponding to other voltages within the range of our voltmeter by taking the ratio between any voltage and the voltage corresponding to zero decibels and then looking up the number of decibels corresponding to this ratio in any table of db versus voltage ratio, such as has been published in TELEPHONY'S Engineering Data Sheets.

Activities of Commissions and Courts

Hearst Renews Fight Over Seized Telegrams

William Randolph Hearst on September 9 reopened his fight with the Senate lobby investigating committee over seizure of telegrams by committee agents. Attorneys filed an appeal with the United States Court of Appeals from a district court decision which dismissed Mr. Hearst's petition for an injunction against the committee on grounds of lack of jurisdiction.

Mr. Hearst had sought an injunction to restrain the Federal Communications Commission from giving any messages to the Senate committee and to restrain the committee from using messages already received or from receiving others.

The appeal stated the sole question presented was whether the judiciary "has jurisdiction to entertain a suit to enjoin five men, members of the United States Senate, individually or as a senatorial committee, from violating the rights of a citizen as guaranteed by the Constitution of the United States."

The Federal Communications Commission, the appeal said, had no authority, mandatory or discretionary, to disclose the contents of a telegraphic communication to any agency of the government for any purpose whatsoever.

▼ ▼

FCC Holds Companies Are "Connecting Carriers"

Taking action on the examiner's reports, the Telephone Division of the Federal Communications Commission ruled on September 9 that the following companies are telephone wire "connecting carriers" and as such are subject only to Sections 201-205 of the Communications Act of 1934:

Standard Telephone & Telegraph Co., Troy, Ala.; Pioneer Telephone Co., St. Paul, Minn., and its operating subsidiaries; Aitkin Deerwood Telephone Co., Aitkin, Minn.; Carver County Telephone Co., Norwood, Minn.; Douglas County Telephone Co., Brandon, Minn.; Empire Telephone Co., Grove City, Minn.; Howato Telephone Co., Cokato, Minn.

Long Prairie Telephone Co., Long Prairie, Minn.; North Star Telephone Corp., Mountain Lake, Minn.; Rural Telephone Co., Osseo, Minn.; Swift County Telephone Corp., Benson, Minn.; Wabasha County Telephone Co., Plainview, Minn.; Winona County Telephone Co., Lewiston, Minn.; Sullivan Telephone Co., Sullivan, Ind.

The DeKalb-Ogle Telephone Co., Sycamore, Ill.; Citizens Telephone Co. of Clay County, Brazil, Ind.; the Mansfield Telephone Co., Mansfield, Ohio; and the Chillicothe Telephone Co., Chillicothe, Ohio.

It was further ordered that the order of the FCC entered on January 10 of this year, relative to the Chillicothe Telephone Co., be vacated and set aside.

▼ ▼

Southwestern States Company Seeks Reorganization

The Southwestern States Telephone Co., which has operating headquarters at Brownwood, Texas, filed a petition on September 10 in federal court in Wilmington, Dela., to reorganize under section 77-B of the national bankruptcy act. The company operates exchanges having approximately 11,500 telephones in Texas, Arkansas and Oklahoma.

The petition states that the company is unable to meet maturing obligations and has more than $2,000,000 of 6 per cent bonds. The company has been in receivership since 1932.

Judge John P. Nields of the United States District Court, on September 12, appointed William H. Heald of Wilmington and Charles H. Loveland of Los Angeles, trustees of the Southwestern States company. Judge Nields fixed October 9 for a hearing to determine whether the trustees should be made permanent or others named.

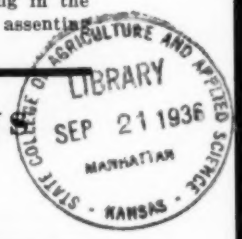
▼ ▼

Wins Fight Against Paying Rate-Probe Costs

The United States Circuit Court of Appeals in New Orleans, La., on August 26 declared unconstitutional Act 20 of the second session of the Louisiana legislature of 1934, adopted under the influence of the late Huey P. Long. In doing so, the three-judge court granted the Southern Bell Telephone & Telegraph Co. an interlocutory injunction against the Louisiana Public Service Commission.

The act, which was declared unconstitutional, was designed to set in motion investigations of public utilities in Louisiana and for saddling the cost of such investigations upon the companies.

A dissenting vote in the ruling was cast by District Judge Joseph C. Hutcheson, of Houston, Texas, serving in the New Orleans district. The assenting



Since the Earliest Days of this Century

WB

Thirty-five years of concentration on the problem of producing the best possible Telephone Wire. Thirty-five years of improving manufacturing methods, of checking and improving construction and materials. Thirty-five years under the acid test of actual use by hundreds of Telephone Companies throughout the world. When you buy Whitney Blake Telephone Wire you buy more than conductor and insulating material.

Telephone Wire

RUBBER COVERED
COPPERWELD - BRONZE - COPPER
DROP - INSIDE and BRIDLE

MANUFACTURED BY
The Whitney Blake Co.
SOLE SELLING AGENTS IN U. S. A.

Graybar
ELECTRIC COMPANY

FOREIGN DISTRIBUTORS: *International Standard Electric Corporation*, 67 Broad St., N. Y. C.

FIG. 3. GAS TEST CIRCUIT

the cathode open. Under this condition, if there is any current flow, there must be leakage between the filament and the cathode. This is shown in Fig. 4.

Rates for
ADVERTISEMENTS
in this section
furnished upon request

CABLE—LEAD ENCASED

Kennecott Wire and Cable Company, Subsidiary of Kennecott Copper Corporation (formerly American Electrical Works), Phillipsdale, R. I.—Paper telephone cable, switchboard cable, bare copper wire. Chicago office: 20 N. Wacker Drive; Cincinnati: Traction Bldg.; New York: 100 E. 42nd St.

CORDS, CABLE AND WIRE

Lenz Electrical Manufacturing Co., 1751 N. Western Ave., Chicago—Established 1904—telephone and switchboard cords for all makes of equipment, braided and lead-covered telephone cable, flame-proof jumper wire, interior telephone wire, switchboard wire.

CORDS AND WIRE

Runzel Cord & Wire Co., 4727-31 Montrose Ave., Chicago — Telephone and Switchboard Cords, Flame-proof Jumper Wire, Switchboard Wire, Interior Telephone Wire. W. L. Runzel, President, has devoted over 40 years to the making of fine telephone cords.

POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

International Creosoting and Construction Co., Galveston, Texas — Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

Jordan Bros. Lumber Co., Box 84, Norfolk, Va.—Virginia White Cedar Poles. Plain or charred and creo-treated butts.

MacGillis & Gibbs Company, Milwaukee, Wis.—Northern White and Western Red Cedar Poles. Plain or butt-treated. Immediate quotations on request.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt treated.

H. Sigalet & Company, Ltd., Lumby, B. C., Canada—Western Red Cedar Poles. Plain or Butt treated.

Valentine Clark Corporation, 2516 Dosweil Ave., St. Paul, Minn.—Finished Cedar Poles. Plain or Butt treated.

judges, Senior Circuit Judge Rufus E. Foster and District Judge Wayne G. Borah, ruled that such an act is violative of the equal protection clause of the 14th Amendment to the Constitution of the United States. They declared it would "violate every principle of statutory construction to hold that natural persons are within the intendment of the Act."

In the suit of the Southern Bell Telephone & Telegraph Co., asking for an injunction to restrain the Louisiana commission from enforcing the provisions of the act it was set forth that in addition to the Southern Bell company, there are 42 other telephone companies operated in Louisiana "by individuals, co-partnerships and companies," and that the plaintiff has operating contracts with all of these.

In ordering an investigation of the business of the Southern Bell company some time ago the Louisiana Public Service Commission, "purportedly under the terms of Act 20 of 1934," required the telephone company to pay the sum of $13,226.29, this money to defray the expenses of the investigation, chiefly for the hiring of experts and accountants.

It was to restrain the Louisiana commission from collecting this sum of money from it that the telephone company filed the suit asking for the interlocutory injunction, which the three-judge court granted.

▼ ▼

Commission Rulings and Schedule of Hearings

Federal Communications Commission Washington, D. C.

August 25: Telephone Division granted authority to the Southwestern Bell

PREPAREDNESS

By MISS ANNE BARNES

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa.

IN spite of the fact that there is so much forced idleness in the world today, a great many employed people are not making the most, if anything, of their opportunities. They surely must realize how much better off they are than the idle ones; better off because they, at least, are able to pay as they go, instead of being harassed by debts darkening their pathway with no definite possibility of paying them off soon.

Comparatively few people average up in performance to their ability. If this is not true, why do boards of education of schools sometimes have such a difficult time finding suitable persons to fill important positions left vacant because of death or transfer? Is the same not true in the telephone organization?

We are informed that our chief operator is leaving the service. We had never given such a possibility a thought, and we cannot accustom ourselves to the thought that someone else will assume her duties. But after a while we begin to take our own measure for the job, and also that of the others on the force likely to be considered, and find that none of us measures up to the proper standards.

We all go back and forth to our work nursing a secret hope that *we* will be chosen for the position and be allowed to *ride along* for a while until we can learn her work. "But," said a chief operator who had an experience of this kind, "I found out as time went on it was not *riding easily along* that I was doing but it was *tough sledding* instead for a long, long time. The routine part of my duties as chief operator was the least difficult of my responsibilities. Securing, holding, and earning the confidence of my operators was the most difficult.

"In my efforts to measure up to my responsibilities, I forgot all about certain privileges the chief operator was allowed. I used to envy her because of her Sundays and holidays off duty. The chief operator's salary did not seem so alluring as it had always seemed to me when I realized all it entailed. Take it from me, prospective chief operators, it was not *riding along* but instead very *tough sledding* for a long, long time; much longer than if I had been *prepared.*"

Undoubtedly, most experienced operators can "ride along" on their jobs, satisfactorily, as their duties are two-thirds routine matter, but if a new chief operator thinks she can do so she is sure to find *tough sledding* ahead.

Moral: "The secret of success in life, is for a man to be *ready* for his opportunity *when it comes.*"—Disraeli.

Telephone Co. to supplement its existing toll facilities between East St. Louis, Ill., and Harrisonville, Mo., by acquiring and operating certain of the existing facilities of the United Telephone Co., i.e., two metallic open wire circuits, one in the vicinity of Bay, Mo., and the other in the vicinity of Florence, Mo.

September 8: Hearing before Telephone Division on reports of the examiner to determine whether the Champaign Telephone Co., of Urbana, Ohio, and the Cass County Telephone Co. of Harrisonville, Mo., come under the jurisdiction of the FCC.

September 9: Telephone Division, acting on the examiner's report, ruled that The Harrison Telephone Co., of Harrison, Ohio, is subject to all provisions of the Communications Act of 1934 applicable to wire telephone carriers.

September 9: Telephone Division, acting upon the examiner's reports, ruled that the following companies are "connecting carriers" and as such are subject only to the provisions of Sections 201-205 of the Communications Act:

Standard Telephone & Telegraph Co., Troy, Ala.; Pioneer Telephone Co., St. Paul, Minn., and its operating subsidiaries; Aitkin Deerwood Telephone Co., Aitkin, Minn.; Carver County Telephone Co., Norwood, Minn.; Douglas County Telephone Co., Brandon, Minn.; Empire Telephone Co., Grove City, Minn.; Howato Telephone Co., Cokato, Minn.

Long Prairie Telephone Co., Long Prairie, Minn.; North Star Telephone Corp., Mountain Lake, Minn.; Rural Telephone Co., Osseo, Minn.; Swift County Telephone Corp., Benson, Minn.; Wabasha County Telephone Co., Plainview, Minn.; Winona County Telephone Co., Lewiston, Minn.; the Sullivan Telephone Co., Sullivan, Ind.

The DeKalb-Ogle Telephone Co., Sycamore, Ill.; the Citizens Telephone Co. of Clay County, Brazil, Ind.; the Mansfield Telephone Co., Mansfield, Ohio; and the Chillicothe Telephone Co., Chillicothe, Ohio.

It was further ordered that the order of the commission entered on January 10, of this year, relative to the Chillicothe Telephone Co., "be and the same is hereby vacated, set aside and held for naught."

September 9: Telephone Division adopted statement of facts granting renewal of coastal harbor station licenses to the following companies:

New York Telephone Co. (WOX), New York City; Pacific Telephone & Telegraph Co. (KLH), San Rafael, Calif.; Southern California Telephone Co. (KOU), San Pedro, Calif.; and the Pacific Telephone & Telegraph Co. (KPW), Edmonds, Wash.

September 9: Telephone Division in Docket No. 4122 on its own motion ordered an immediate investigation of the rates, charges, classifications, services and practices of the American Telephone & Telegraph Co. in the rendition of interstate utility services.

September 28: Hearing before Telephone Division on the examiner's report in the case of the Rochester Telephone Corp., of Rochester, N. Y., in which it was recommended that the company be subject to federal regulations because it "is deemed to be under the indirect control of the Bell companies" (TELEPHONY of July 18, page 28).

California Railroad Commission

August 26: Order issued dismissing complaints of San Marino residents against the Southern California Telephone Co. The complainants had asked the commission to compel the company to adjust rates so they would be equal for all San Marino residents.

Recent adjustments in extended-area

ENGINEERING
Construction
Appraisals
Audits
Accounting
REORGANIZATION AND REFINANCING CONSULTANTS
UTILITY ENGINEERING AND CONSTRUCTION COMPANY
1900 West 43rd Street, Kansas City, Kansas

J. G. WRAY & CO.
Telephone Engineers
Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization, and Operation of Telephone Companies.
3324 Bankers Bldg., Chicago

Consulting Telephone Engineer
"Modernization of Equipment and Methods for Improved Service"
GARRISON BABCOCK
1104 Third Avenue, Seattle, Washington

Frank F. Fowle & Co.
Electrical and Mechanical ENGINEERS
35 East Wacker Drive CHICAGO

JOHN C. LARKIN AND COMPANY
Consulting Accountants and Engineers
Specializing in a Professional Service to Telephone Utilities Covering the Field of Accounting and Engineering
Chamber of Commerce Building Syracuse, New York

ACCOUNTING
HERDRICH and BOGGS
Certified Public Accountants
803 Electric Building
INDIANAPOLIS, IND.

Telephone Directory
ADVERTISING
Write or telephone for proposition
L. M. BERRY & CO.
Call L. D. 16 Telephone Bldg. Dayton, O.

PLANT ENGINEERING and CONSTRUCTION
Building and Rebuilding Telephone Plants
Consultation Services
Wiring Jobs, Installations, Switchboard Alterations
Expert Consultants on All Telephone Problems
National Engineering and Construction Co.
1031 West Van Buren Street
CHICAGO

Telephone Securities Corporation
120 So. La Salle St. Chicago, Ill.
Telephone Franklin 0181
Underwriters and distributors of securities of Independent telephone companies
Inquiries invited

A SALES ORGANIZATION EXCLUSIVELY
TELERHONE BLDG. KANSAS CITY, MO.

JOHN M. COOK
TELEPHONE ENGINEER
Specializing in toll compensation matters—for the better part of twenty-nine years.
Standard Bldg. ATLANTA, GA.

Accounting, Tax and Rate Consultant
22 Years' Continuous Contact with Telephone Organizations
C. B. RUSSELL
Interurban Bldg., Columbus, Ohio

CLASSIFIED SECTION

Rates 10 cents per word payable in advance.
Minimum charge $2.00 for 20 words or less.

SUBSCRIBER BILLS

PRICED BY SIZE

It's cheaper to buy your subscriber bills by size. Any copy you want. No extra charge for padding, perforating, or punching. Send a sample for prices.

TELEPHONE PRINTING

We operate the largest printing plant in the world devoted exclusively to telephone printing. We have standard forms in stock covering every phase of telephone accounting and office records. We can do your telephone printing better because we know the telephone business.

We can save you money—send a sample for price.

See your "Suttle Salesman" for further information.

SUTTLE EQUIPMENT CO.
LAWRENCEVILLE, ILLINOIS

HELP WANTED

WANTED—Several telephone linemen experienced in telephone line construction work. The Columbia Telephone Company, 22 North Third street, Columbia, Pa.

RECONDITIONED EQUIPMENT

•

Answering Jacks
Multiple Jacks
Lamp Jacks
Lamps and Caps
Repeating Coils
Mounting Strips

BUCKEYE TELEPHONE AND SUPPLY CO.
COLUMBUS, OHIO

SPECIALISTS IN
Rebuilding and Repairing

TRANSMITTERS

Absolutely finest workmanship guaranteed.

Baked, black, velvet finish. New granular carbon. Workmanship, adjustments and tests made with the latest and most improved apparatus. 50c each less backs. One-year money-back guarantee.

Full information on request

THIS WEEK'S SPECIAL

W. E. No. 1317 Wall Phones. Completely rebuilt in A-1 shape. One year guarantee.
Kellogg Rebuilt 165-line Magneto Switchboard, 15 pairs of cords.... $350.00
50 W. E. Common Battery Steel Hotel Sets, concealed gongs, each 8.50
Automatic P.A.X. and charging unit with 24 Telephones, handset and wall phone complete with dials, rebuilt like new 485.00

Telephone Repair Shop
Rogers Park Station Chicago
Owned and Managed by Dan'l H. McNulty

FOR SALE

CORDS

Bronze Tinsel Receiver Cords.....15c
Bronze Tinsel Desk Stand Cords.....30c
Special Sale on Switchboard Cords.
Special Sale on Drop Wire.
INDEPENDENT CORD CO.
FRAMINGHAM, MASS.

New Style Pocket Detecto-Meters
Voltage .0 to 1.5.
Resistance .0 to 10,000 ohms.
With zero adjust.
$9.75 STEWART BROS.
Ottawa, Ill.

HELP WANTED

WANTED—Young man for switchboard repair and maintenance. Permanent position. Prefer one who has had experience in switchboard installation. State age, past experience, salary expected, etc. Address 8562, care of TELEPHONY.

rates made by the telephone company tend to improve conditions which caused the complaint, the commission's opinion stated.

Louisiana Public Service Commission

August 26: On motion of the complainants, considered at session of the commission held August 5, the complaint of residents of Leonville against the Louisiana Telephone Co. was ordered dismissed.

Minnesota Railroad and Warehouse Commission

September 10: Approval granted joint application of the St. Clair Telephone Co. for authority to sell and Leo. A. Frank, an individual, to buy all the assets of the St. Clair company.

Nebraska State Railway Commission

September 30: Hearing on applications of the Hershey Telephone Co. for authority to sell its exchange to Glenn Fletcher and of Mr. Fletcher to purchase the property of the Sutherland-Fairview Telephone Co.

New York Public Service Commission

September 14: Order issued approving sale of the Nicholville Telephone Co., Nicholville, by Edwin E. Chambers to Royal S. Chambers. The company serves about 200 stations in the villages of Nicholville, Winthrop, Brasher Falls and North Lawrence. The sale price was $9,500.

North Carolina Public Utilities Commission

September 14: Hearing on application of the Carolina Telephone & Telegraph Co. for authority to make certain improvements in its equipment, including the installation of the dial system in its exchanges at Richlands, Jacksonville and Swansboro. The proposed changes include the inauguration of toll rates between these three towns.

Ohio Public Utilities Commission

September 8: Petition filed by the Citizens Exchange Telephone Co., of Hamler, Ohio, for authority to increase its rates. The company pleaded that the existing rates do not afford a fair return on the value of its property.

September 24: Hearing on application of the Polk Rural Telephone Co. for authority to increase its rates.

A petition signed by a number of the residents of Polk, protesting the proposed increased rates of the Polk company was received by the commission on September 9. The protest questions the capitalization of the applicant and challenges the operating cost.

Oklahoma Corporation Commission

September 15: Hearing on application of the Southwestern Bell Telephone Co. for authority to increase its rates at Marietta.

September 15: Hearing on application of the Southwestern Bell Telephone Co. for authority to discontinue its service in Shamrock, Creek County.

Virginia Corporation Commission

August 28: Approval granted voluntary reductions in rates for certain services of the Chesapeake & Potomac Telephone Co amounting to savings of approximately $161,000 to Virginia subscribers.

Wisconsin Public Service Commission

September 4: Hearing in Madison on application of the Wisconsin Telephone Co. for revision and adjustment of rural service rates at its Jefferson exchange.